Scanning - Shortwave - Ham Radio - Equipment
Internet Streaming - Computers - Antique Radio

Monitoring Times

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My Big Fat Voice of Greece Website

Also in this issue:

- A Life-Changing Internet Radio
- HD Radio's Long and Winding Road
- Howard Hughes: Ham Radio Operator
- MT Review: Grace's GDI-IR3020 Wifi Radio

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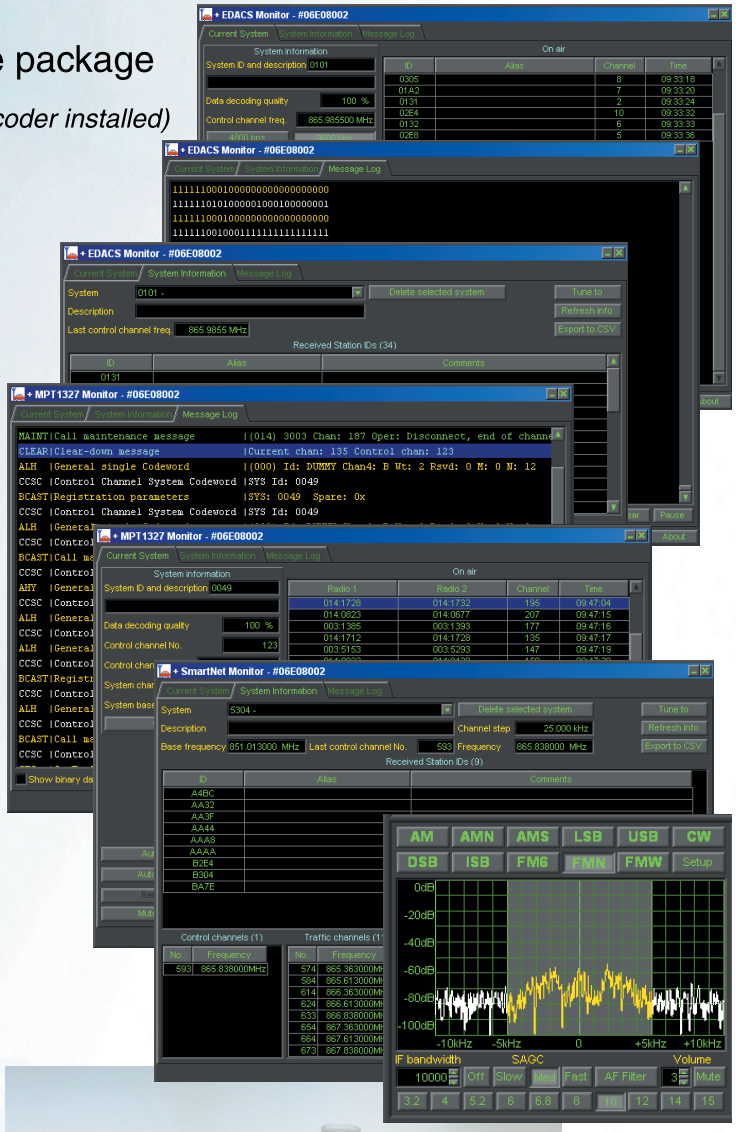

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Vol. 28 No. 8 August 2009

My Big Fat Greek Website

By Eric Bryan

The Voice of Greece is enjoyable for its music, even though it doesn't offer many English language programs. When summer propagation conditions made VoG hard to receive, Eric Bryan went looking for Greek music on the VoG website.

He found a very extensive website and much of the same music he'd enjoyed over the air, but English was just as scarce. So turn to page 8 and let Eric help you negotiate your way through the many screens of "My Big Fat Greek Website."

On our Cover: A valley view from the Temple of Apollo at Delphi. Inset, right: The Porch of Six Maidens. Photos by Earle Seaverns.

C O N T E N T S

Grace: A Life-Changing Radio 12
By Mike Meenan

When Mike left Palm Springs and the radio station, where he worked in the newsroom, for a home in San Francisco, he never expected to be able to tune into his old station again. That is, until his wife bought him a little Grace internet radio. Then Mike discovered that not only could he listen to news from his old stomping grounds again, but he had a front seat on breaking news from around the world!

HD Radio's Long and Winding Road 13
By Ken Reitz

"HD" or digital radio has spent the last eight years shuffling along the digital highway. Finally, there are more HD-capable radios than ever to choose from and more stations to listen to, but is it too little, too late? Check out this comprehensive overview for the latest in home and mobile receivers and how they perform.

Howard Hughes, Ham Radio Operator 16
By Linton Robertson

We hear lots of names applied to this larger-than-life personality from the past century. But "Howard Hughes, Ham Radio Operator"?!

Not only did he get his first transmitter at age 11, but amateur radio played a huge role in his record-breaking flight around the world in July 1938. Here's how Howard Hughes, Charles Perrine, Ralph Thomas, Dave Evans, and Hughes' radio engineer Richard Stoddard talked their way around the world.

Reviews

If one writer found the Grace's starter model to be life-changing (see feature above), he would really be blown away by their model GDI-IR3020 WiFi Radio. With more presets and multiple audio sources, this radio just about does it all. (See page 68.)

To improve reception in a portable AM radio, a favorite solution is to use a loop antenna. Grundig is the latest to enter this field with their Grundig AN200 Antenna Loop. Performance and price are both right on! (Page 70.)

What's all the fuss about Netbook computers?! Everyone seems to be raving about them – and rightly so, says John Catalano. But it's been a long and rocky road to what may finally live up to the original promise of the "personal computer." (Turn to page 71.)

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George Zeller ..... Outer Limits

You Speak, We Listen

What are you interested in reading and learning about in 2010? Fill out the poll below and tell us what you would like to see so that we may serve you better. You may simply check off items of interest or rate them in order of importance or circle those that are multiple choice.

Provide your name and address and you will be entered into a drawing for numerous prizes -- books, equipment, and *MT* subscriptions -- as our thanks. So speak up!

Please mail your survey to Monitoring Times Survey, 7540 Hwy 64 West, Brasstown, NC 28904. You may also download a pdf of the survey from **www.monitoringtimes.com/ mt2009survey.pdf** and email the completed form to *editor@monitoringtimes.com.*

SURVEY SOURCE

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____MT Express subscription
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AMATEUR RADIO

____Basics (Modes, bands, power, activities, etc.)
____Construction (antennas, kits, home brew)
____Contesting, Foxhunting
____Digital, internet, new modes
____DXing
____Emergency nets
____Events/ conventions
____HF, VHF/UHF, Microwave operation (please circle)
____Software for hams
____Special techniques: satellite, shuttle, moonbounce, meteor scatter, etc.)
____Studying for the exam
____Theory
(Other)_____
____No interest

BROADCASTING

____AM domestic
____FM/TV domestic
____Digital modes
____International shortwave
____Music
____News and documentaries
____Pirate and clandestine radio
____Station equipment
____Station profiles and personalities
____Streaming/podcasting/ videocasting, etc
(Other)_____
____No interest

NONBROADCAST COMMS

____Digital modes
____Voice modes
____Aeronautical comms
____Citizens Band
____Federal gov/military
____Hams
____Longwave
____Marine comms
____Numbers stations
(Other) _____
____No interest

SCANNING

____Aeronautical
____Boats
____Business/industrial
____Federal gov/military
____Ham radio
____Public safety
____Satellites
____Software and programming
____State and federal laws
____Streaming audio/internet sites
____Trains and transportation
____Weather
(Other)_____
____No interest

TECHNICAL

____Antenna design
____Antique restoration
____Construction projects
____Electronic theory (Advanced)
____Electronic theory (Intro/tutorial)
____Historical radio
____Internet tools and resources
____Internet streaming/podcasting/ videocasting, etc.
____Propagation
____Receiver modifications
____Software and programming: HF modes / scanning (please circle)

Receivers and scanners:

____operational details
____specifications
(Other)_____

REVIEWS

____Accessories
____AM/FM, HD, or Internet radios
____Antennas
____Computers and peripherals
____Digital decoders
____Scanners
____Shortwave receivers
____Software
____Test equipment
(Other)_____

OFF-CENTER INTERESTS

____Astronomy / Radio Astronomy
____Computer operation
____General science
____High voltage experiments (Van de Graff generators, etc.)
____Hydronics
____Medical quackery
____Nuclear radiation (Detectors, etc.)
____Seismic monitoring
____Sferics ("Natural radio")
____Sub-terrainian comms
____Ultrasonics
____Weather/storm monitoring
(Other)_____

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COMMUNICATIONS

by Ken Reitz

"Communications" is compiled by Ken Reitz KS4ZR (kenreitz@monitoringtimes.com) from news clippings and links supplied by our readers. Many thanks to this month's fine reporters: Anonymous, David R. Alpert, Rachel Baughn, David G8SZX, Alokesh Gupta, Ira Paul, Larry Van Horn, and George Zeller.

SHORTWAVE/AMATEUR RADIO

U.S. Couple Charged with Spying for Cuba

Things seemed to be going so well for Cuba: the Organization of American States (OAS) was planning to rehab Cuba's seat in that organization after a 47 year absence; travel restrictions were lifted allowing Cuban citizens to make visits to family still on the island; top level talks had been planned for easing other restrictions.

Then came news in early June, in a widely circulated story, of the arrest of an elderly couple with State Department connections charged with spying for Cuba. Reports allege the two had for decades passed Cuban-related State Department information in ways that changed with the times. Early on, it's alleged, they received messages from their Cuban handlers via the well-known HF spy numbers stations on a shortwave radio it's said was given to them by the Cuban government. In recent years, reports say, they made contact via e-mail.

The story of the couple's arrest caused a flurry of excitement among those who have tirelessly monitored spy numbers stations for decades. Finally, they could put a face to the imagined spooks tuning in to take their orders from Havana. But, articles reporting the arrest painted the pair more like *Get Smart* than *007*. The *Washington Post*, for example, quoted unnamed State Department sources as saying that the two had no access to information that would have compromised actual U.S. spies in Cuba. It appears also that they received little if any money for their activities; they had apparently never bothered to learn Spanish, and it turned out that the husband kept a detailed and unencrypted diary of his efforts throughout the decades of his alleged spying.

DRM Portable Available

After years of anticipation, Digital Radio Mondiale (DRM) has announced the production of a portable shortwave radio capable of tuning DRM digital shortwave signals. At press time, the radio had not received FCC approval for sale in the U.S., though it was expected to receive such approval this summer. No price has been announced.

According to specifications on the DRM web site, the Uniwave Di-Wave 100 will feature a 3.5" TFT LCD display with a multi-language graphic user interface that shows the time and date, station name and program information. Reception includes DRM on shortwave, long wave and medium wave and FM stereo with RDS display. The radio will have a 768 station memory bank (256 DRM station memory), a 3" 1 watt speaker, headphone jack, external antenna jack, AC adapter and a 3 volt clock battery backup.

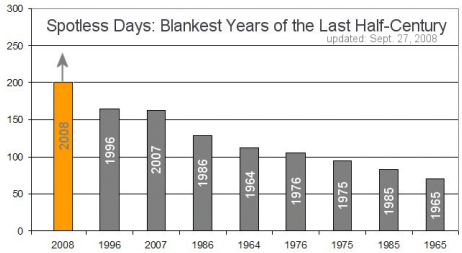
Other interesting features include 10 minute

Uniwave Portable DRM Receiver could be available later this summer. (Courtesy: Universal Radio)

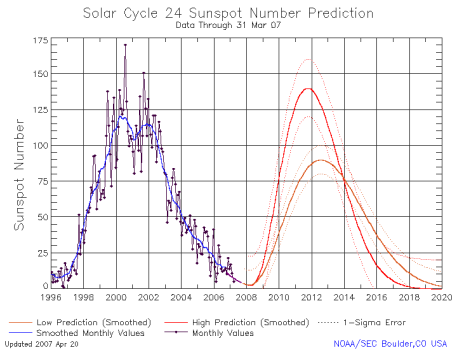
time shifting (up to 10 minutes allowed); alternative frequency shifting, a built-in SD card reader, USB connection for MP3 and MP4 playback and a photo album viewer. The Di-wave 100 will be available from Universal Radio (**www.universal-radio.com/catalog/portable/0023.html**),

The "Don't Blink" Solar Cycle

If you've been waiting for Solar Cycle 24 to start, you'll be disappointed to hear it's already half over. The Solar Cycle 24 Prediction Panel (yes, there is such a thing), comprised of NOAA, NASA, and several other international science-related government organizations, have released their predictions for Solar Cycle 24. The results



Spotless Sun: A Record (of sorts) (Courtesy: NASA)



Solar Cycle hits peak in May 2013; will you be ready? (Courtesy: NASA)

are: The solar minimum occurred in December 2008, and the solar maximum is predicted to occur in May 2013. The report indicated that Solar Cycle 24 will have a peak sunspot number of 90, making it the lowest of the sunspot peaks since 1928.

But, the low numbers can be deceiving. There's still a risk of wholesale economic damage due to a single severe solar storm. The National Academy of Sciences reported that the great solar storm of 1859 happened during a similarly benign solar cycle. The report indicated that if such a storm were to occur today, the many hundreds of satellites now in orbit, as well as thousands of sensitive electronic installations worldwide and a vulnerable power grid could be at risk. Such a storm, it estimated, could cause $1 to 2 trillion in damage.

PUBLIC SERVICE

GAO/GPS Report Causes Media Panic

The Government Accountability Office (GAO), the investigative arm of congress charged with examining the use of public funds, released a report in May that indicated the nation's GPS satellite constellation was at risk from an aging fleet of satellites and problems related to launching replacements. It must have been a slow news week, because that report triggered wide-spread panic among the 24/7 news outlets and America's dying newspaper industry desperate to keep up. An authoritative explanation of the status of the GPS fleet came from an unbeatable source through an odd outlet: the Air Force Space Command on Twitter.

According to Air Force Space Command Public Affairs, AFSPC hosted a tweet forum on the Global Positioning System on May 20 from 2 to 3 pm. During the forum, Col. Dave Buckman, command lead for Position, Navigation and Timing, responded to fellow tweeter's questions on GPS and clarified some points that came out of the recent GAO report in Twitter-style prose. "We're committed to the modernization of GPS. We already have two satellite programs underway to update our fleet. Agree w/GAO there's a potential risk but GPS isn't falling out of the sky – we have plans to mitigate risk and prevent a gap in coverage."

Is Your Cell Phone Spying on You?

A story on Houston's Fox 26 News showed how software obtained for $250 via the Internet allowed their news team to spy on a willing colleague (**www.myfoxhouston.com/dpp/news/weird/090520_spy_phones**). The software logged all incoming and outgoing text messages as well as conversations, and let the news team turn on the targeted cell phone at will.

The report explained that, unlike computers, cell phones don't have a firewall, and right now there's not much anti-spyware available. The software enables the spy to turn your cell phone into a microphone that can transmit conversations you're having, even if you are not using your phone. The story lists five ways to tell if someone is using your phone against you and recommends that the only way to make sure no one can listen to your most sensitive conversations is to turn off the phone and take out the battery.

BROADCASTING

Appeals Court Backs LPFM Community

A report in *Radio World* on-line from June 8 notes that legal efforts by the National Association of Broadcasters (NAB), the lobby group for the broadcast industry, have been thwarted at the appeals court level by a decision in favor of community broadcasters using low power FM (LPFM). The center of the dispute is a technical one stemming from relaxed FCC rules regarding third-adjacent channel interference protection that the NAB argued gave "LPFM stations primary status over full-power FM stations in certain circumstances."

The appeals court was not swayed and ruled in favor of the new FCC rules and LPFM stations. The result means that some 40 LPFM stations that had been threatened with shutting down may now remain on the air. According to the article, Congress is currently working on legislation that would favor adding more LPFM stations on the air.

SATELLITE

AT&T Launches *CruiseCast*

Wobbly Sirius satellite radio has been trying to push its three-channel kids' TV service, *Sirius BackSeat TV*, despite its poor track record in the satellite radio market. But, the genius of capitalism is that, even if someone else's business plan flops, your plan just might click. Telephone giant AT&T has teamed up with RaySat Broadcasting, a Dallas-based, privately held tech company, to launch *CruiseCast*, an auto-based, mobile satellite TV/radio service with coverage over the continental U.S.

The service, which offers 22 TV channels, including ESPN Mobile, AccuWeather, and Fox News, as well as 20 music channels, began operating the first week of June. Subscriptions are $28/month, but require some expensive reception equipment to join the fun. The satellite antenna and receiver cost $1,300 and you'll need headrest TV sets on which to watch that can add another $700 to the installation.

AT&T CruiseCast mobile satellite TV antenna on roof-top. The antenna and receiver cost $1,300 and the service is $28/month. (Courtesy: AT&T CruiseCast)

Sirius BackSeat, alternative to CruiseCast, is a $300 TV/satellite radio tuner, and available only on certain Chrysler and Jeep models, but you'll still need the headrest TV set. (Courtesy: Sirius Satellite Radio)

CruiseCast contends it doesn't compete with *Sirius' BackSeat TV* service, which is cheaper ($6.99/month on top of your $13.99/month Sirius radio subscription) but is limited to only three channels (Nickelodeon, Disney and Cartoon Network). And, it is only available on a handful of Chrysler/Jeep products. *CruiseCast*, which says it may add a movie channel at a later date, is very optimistic about future subscribers, citing industry figures that predict the backseat video market will grow to 65 million by 2017.

FCC POLICY

Rural Broadband: FCC Priority

The FCC, now under new management, has wasted little time working on broadcast and Internet reform. At the end of May the FCC released an 18 page document called "A Report on a Rural Broadband Strategy." **http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291012A1.pdf**

The report noted that the U.S. has traditionally subsidized service to rural America from highways to railway service, from postal service to rural electrification and urges that rural access to high speed Internet not be different. The report noted, too, that "network 'openness' is not just another bromide, but a principal we must tenaciously preserve."

The FCC report also recognized the potential cost of such a policy. If, for example, an all-wireless rural broadband policy were adopted, there would be a need for 16,000 new towers to be constructed to handle the traffic. The report also addressed issues confronting rural America regarding broadcasting, about which you can read more in this month's *American Bandscan* column.

FCC ENFORCEMENT

Smith Cracks Down on Bootleggers

Laura Smith hit the ground running following her appointment this spring as FCC Special Counsel. Over a six week period the FCC Enforcement Bureau undertook a widespread crackdown on CB radio operators, using what the FCC termed, "overpowered transmitting equipment on 11 meters." The crackdown included a sweep of the Dayton, Ohio, area in which three local CBers received a "Warning of Unlicensed Radio Operation" from Ms. Smith which included the threat that "fines normally range from $7,500 to $10,000." Two other Ohio bootleggers received similar letters, as did CBers from Massachusetts, North Carolina, Michigan, Missouri and Montana.

"Destitute" AM Station Fined by FCC

Snarled finances and a lapsed license have resulted in a $7,000 fine for religious broadcaster WBCE-AM (Wickliffe, Kentucky). According to FCC documents, the station was originally bought through an SBA loan, which was then acquired by a Dallas-based bank, which accelerated the payment on the loan, forcing a foreclosure. Meanwhile, the station's license had expired. The previous owner had not bothered to file a license renewal and the new owner had not gotten around to filing until seven months after the license expired.

After receiving the FCC's Notice of Apparent Liability (NAL) for Forfeiture in the amount of $7,000, the station's new owner, who bought the remains of WBCE at auction, asked that the fine be cancelled because the station was insolvent. But, the FCC would like to see some proof, perhaps federal tax returns for the past three years? Until then, they'll take a check or money order.

CONSUMER'S CORNER

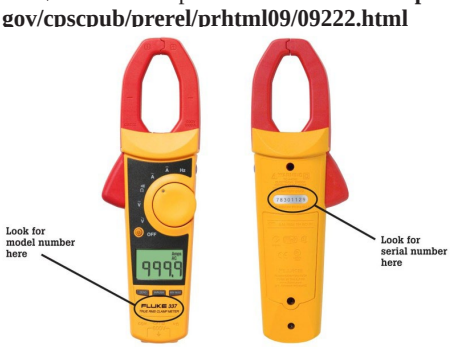
Circuit City Rises from Grave

It's baaaaack! From bankruptcy in the fall of 2008 to liquidation in the winter of 2009, Circuit City, the decades-old consumer-electronics firm formerly based in Richmond, Virginia, is alive and well on the Web. The remains of Circuit City were purchased by Systemax, Inc., a Port Washington, New York-based direct marketer of brand name and private-label products which had earlier bought CompUSA. They've kept the Circuit City logo and the web site looks very familiar to anyone who had shopped Circuit City on-line. Prices are low because the firm no longer has to pay the thousands of workers formerly employed by Circuit City or maintain the nationwide chain of brick and mortar stores. **www.circuitcity.com**

Fluke Digital Clamp Meters Recalled

The Consumer Product Safety Commission announced the voluntary recall of Fluke digital clamp meters, of which about 52,000 were sold over an 11 month period. According to CPSC documents "the meters can fail to give an appropriate voltage reading resulting in the operator believing the electrical power is off, posing a shock, electrocution or thermal burn hazard."

The models, starting with the numbers 333, 334, 335, 336, and 337 were sold from January 2008 through February 2009 for between $150 and $375. For complete details visit: **www.cpsc.gov/cpscpub/prerel/prhtml09/09222.html**



THE VOICE OF GREECE:
My Big Fat Greek Website

By Eric Bryan

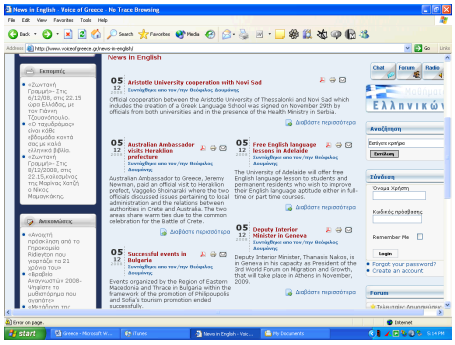
Though the Voice of Greece doesn't carry that much English programming, their music-dominated broadcasts on 9420 kHz have been regular listening for me in the local evenings here in the state of Washington. Last summer, their signal on 9420 was a benchmark for shortwave transmission conditions from Eastern Europe. I listened to some Greek music on the reliable 9420, and occasionally on 7475, almost every evening.

Later in the fall, VOG started to become inaudible, so I decided to turn to the VOG website to see what it had to offer, particularly for music.

VOG News Online

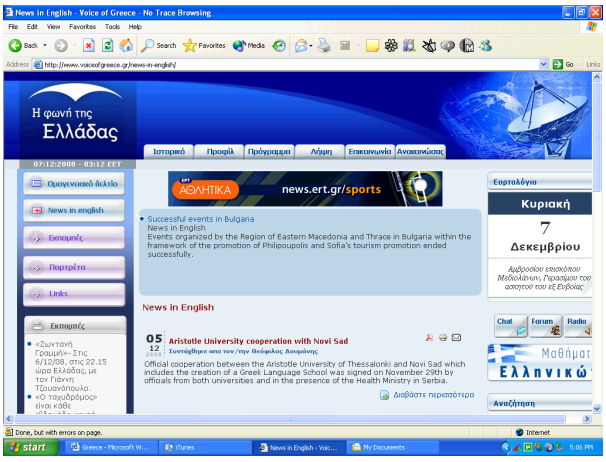
If you go to **www.voiceofgreece.gr/** you'll see, near the top of the page amongst a lot of Greek, a series of rotating news stories in English. To expand into more English, navigate to the vertical menu on your left and click "News in English," marked by a Union Jack. What this does is convert the main body of the webpage – the news headlines and stories – into English. Unfortunately, it leaves most of the peripheral menus and some other phrases and headings in Greek. Also, for some reason, not all of the stories are translated into English; some remain in Greek. (It's starting to look as though English is about as rare on the website as it is on the shortwave transmissions.)

The news stories favor coverage of Greece and Greek-related topics. There's always news on the apparently insoluble Cyprus question, including that on Australian support of a Cyprus solution. At the time of writing, there was also coverage of the opening of the Center for Hellenistic Studies in the library of Alexandria, Egypt, in 2009; news on an orphanage on the island of Prinkipa (or Büyükada), Turkey, in the Sea of Marmara; announcement of the autobiography of Australian philhellene (an enthusiast of Greece and things Greek) writer Patrick White; and the attempt of an ethnic Greek living in Russia to hijack a Transaero flight en route from Varadero (Cuba?) to Moscow.

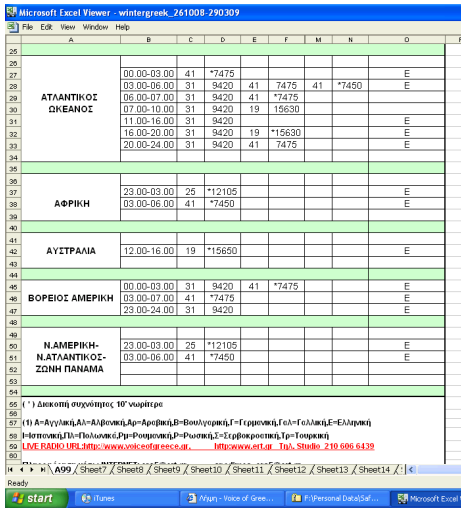


Beneath the main headlines is a "News in English" menu of links to ten more news stories in English. Each news story has an Adobe icon for a PDF version, a printer icon for a printable version, and an envelope icon to email the story (the send-email window that pops up is all in Greek, so some experimenting will be necessary for us non-Greek speakers).

Again in the menu on your left, where you selected "News in English," there is a "Links" button which appears to offer links in English, but they are all in Greek.



Using Internet Explorer, if you slide your cursor over the Greek tab links near the top of the page, you'll find them translated into English along the bottom address bar. From left to right they are "History," "Profile," "Schedules," "Reception," "Contact," and "Announcements." If you click "Reception," you'll be taken to a page almost all in Greek. Scroll down past the Greek text to the "Reception Frequencies" link. Click here and you'll be offered an XLS file. You'll need Microsoft Excel, or simply the Excel Viewer (a free download)



or comparable software to open the file. Open it and you'll find a spreadsheet with VOG's shortwave and mediumwave schedule. It's in Greek, but English speakers can generally make sense of it and will see the familiar 7475, 9420, and 12105 frequencies.

You can also click the "Schedules" tab on the VOG homepage, and again you'll land on a page mostly in Greek. Scroll down past the text and you'll come across three links. The first one is VOG's Monday-Friday program schedule, the next Saturday's, then Sunday's. These are again XLS files, and are spreadsheets. Each is almost completely in Greek, but if you search carefully here and do a little phonetic, do-it-yourself translating, you can find scheduling info for North America.

To the right on the page are "Chat" and "Forum" buttons. In order to access these functions, scroll down and click "Create an account." When the page in Greek pops up, push the lower left button-bar. This brings up another page in Greek. Scroll down to the language box which reads "Greek" and select "British English." This brings up the ERT-online registration terms and agreements page in English. Click the lower left button-bar if you agree with the terms. A registration page in English will pop up, where you can enter a username, password, and email address, etc.

When you finish here, click "Submit," then go to your email for a message from ERT. Follow the link in the message, and a page in Greek (!) will appear. Enter your username in the left

box, your password in the right box, and press "Enter." This brings up the forum page. But after all of this, you will only find a very few posts in English, most of the rest in Greek.

Back on the VOG page, you can press "Chat" next to "Forum," and enter your username and password for access here, too, but after the English sign-in page, everything else appears to be in Greek.

Clicking the nearby large "Greek Lessons" button landed me on a page almost all in – you guessed it – Greek. Talk about being thrown into the deep end for those wanting to learn a little basic Greek!

Well, we've got the news in (mostly) English, and I was mainly after music anyway, so I can't complain.

Streaming Online

Next to the "Chat" and "Forum" buttons is a "Radio" button. Punching this brings up a window labeled "EPT online – Live Radio," with the Windows Media Player. This is a live online stream of ERA-5, the Voice of Greece. In this window, to the left, is a vertical menu of two rows of buttons of different radio streams to choose from.

Starting at the top of the left row:

- EPA 101.8 FM, ERA-SPORT.
- EYTEPO 103.7 FM, Second Programme, described as "quality Greek music." There was some Greek rock here, but with vocals in English. I also heard Badfinger's beautiful "Carry On Till Tomorrow" (Tom Evans/Pete Ham), from *The Magic Christian*, on this stream. Much of the Greek pop rock had folk influences.
- KOSMOS 93.6 FM, with world music. I heard an eclectic mix of instrumental music here. (Some of it sounded as if it came from the soundtrack of a recent James Bond movie.) The instrumentals were good, moody, "thinking" music. There was also an Argentinean folk-pop selection here, sung in Spanish, and other music from around the world.
- FILIA (Greek for "friendship") 107 FM, 665 AM, which broadcasts in 12 languages to immigrants and foreign workers within Greece. This stream also collaborates with the BBC, Radio France International, and Deutsche Welle. Further, FILIA lists a shortwave transmission for 0800-1300 (UTC or UTC + 2?) on 11645 kHz. On FILIA's own page (see below), shortwave is scheduled as 0600-1000 UTC on 12105 kHz, some of that time carrying VOG. On this stream I heard some soft jazz, some with vocals in English.
- 102 FM/1044 AM, Macedonia's ERT-3, First Programme (A Programma), news and international affairs. There was mellow pop music here, with a folk-influenced sound via the use of *bouzouki* (as on the *Zorba the Greek* soundtrack).
- ERA International Network, featuring a map with five EPA links from different areas of Greece and Crete. They describe this as AM/MW "potpourri," with programs designed for Greek students, travelers, sailors, and migrants throughout Europe, the Mediterranean, the Baltic and Black Sea countries, North Africa, and Asia Minor. Two of these streams were inactive; the other three all carried the same jazz stream (some with vocals in English again).

Starting at the top of the right-hand row:

- NET 105.8 FM, news, current affairs, and traffic. I also heard some atmospheric pop rock here, with some lyrics in English.
- TPITO 90.9 FM, Third Programme, with classical music. I heard choral music on this stream.
- VOG/ERA-5 stream. Just as on shortwave, VOG's broadcasts are always worth checking for traditional Greek music, and pop with folk influences.
- Macedonia's ERT-3, Third Programme (C Programma), is supposed to be a stream of the shortwave Voice of Greece "to all continents." What I heard here were fast-chattering announcers in Greek, and pop music. The programming sounded different than the VOG stream.
- 95.8 FM, Macedonia's ERT-3 Second Programme (B Programma), considered Thessalonica's cultural station. I heard what sounded like Italianate ballads sung in operatic style on this stream.

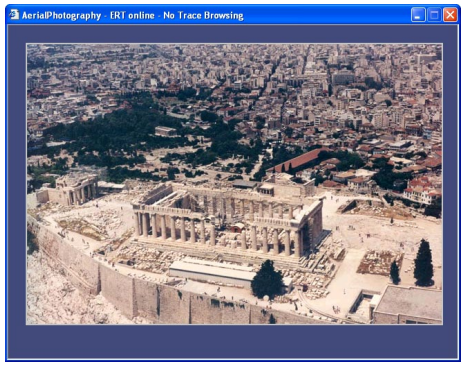
Even though there is no virtual console with controls for the Media Player, simply right click the black bar for a menu with "Play/Pause", "Stop", "Volume", etc.

I did have some of these streams, including the VOG, go dead on me at times, even though the Media Player indicated it was still playing.

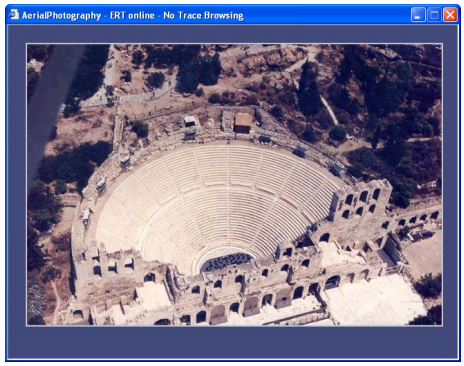
The ERT Site

Though English isn't very well represented on the VOG site, you can go to the ERT (Hellenic Broadcasting Corporation, of which VOG is a part) site at **www.ert.gr/en/** Here there is much more English, with many more links. This page also has news stories, though again, not all of them are translated into English.

Near the bottom of the page are some interesting links, starting with Aerialphotos. This brings up an AerialPhotography window in English (**www.ert.gr/aerialphoto**), featuring images, apparently taken via helicopter, in these categories: "airports," "churches," "archaeological sites," "stadiums," "lakes," "hospitals," "rivers," "public works," "ports," "pollution," "universities," and "scenery." Clicking on one

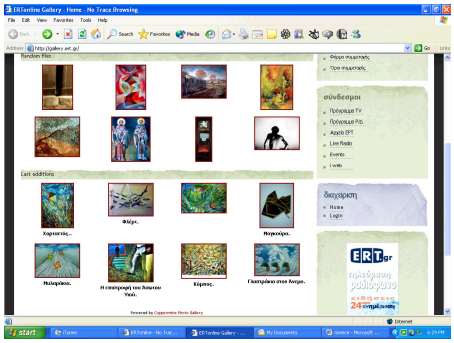


of these categories brings up multiple links, each leading to one or more images. For instance, selecting "archaeological sites," then "Athens," brings you eight images to choose from. Selecting "airports," then "Athens," offers you 27 images.



Down the list from Aerialphotos is Almanac, which draws up an idiosyncratic world events timeline for that specific day. On one day it spanned from 1776 to 2003, with the notable events including the birth of Martin Van Buren, 8th President of the US, and the release of the Rolling Stones' album *Beggars Banquet*.

Another link, **Gallery.ert.gr**, brings up a gallery of colorful images of Greek paintings and photographs. When I looked there were over 1500 image files to view.



Further down the ERT page is a row of links for "cinema," "book," "theatro," and "nature." Clicking these leads to pages in Greek. On all but the "nature" page, you can select "English version" in the upper right of the page, but this will only loop you back to the ERT English homepage you were just on.

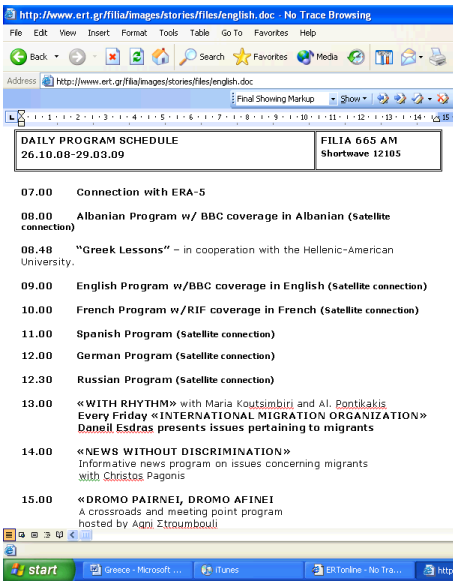
Also here on the ERT homepage is a "Live Radio" link, with a bright red radio icon. This is simply another avenue to reach the Media Player window and choose from one of the 11 streams.

FILIA Homepage

Still on the ERT homepage, next to Live Radio, there is a "News in 11 Languages" link. This leads you to the FILIA homepage. On this page, select NEWS IN ENGLISH to the left, which will translate the page. Here you'll find slightly different news coverage from that of the other two webpages. You can click "File" right above the news headlines to go into a news archive.

Along the top of the FILIA homepage, click "Program," and on the next page again click "Program" and open the Word document. Here you'll have FILIA's current broadcast schedule in English.

The Monday to Friday schedule shows FILIA as connecting with VOG at 0700 UTC, and an English program with BBC coverage at 0900-1000. Other language hours follow, until 2400, when they switch to carrying the KOSMOS broadcast. The schedule shows live VOG concerts for every Friday at 2200-2400. The Saturday and Sunday schedules again show English for 0900-1000, and the same other language hours as weekdays, but with a 2000 UTC connection time to KOSMOS.



http://www.ert.gr/filia/images/stories/files/english.doc - No Trace Browsing

DAILY PROGRAM SCHEDULE 26.10.08-29.03.09	FILIA 665 AM Shortwave 12105

07.00 Connection with ERA-5

08.00 Albanian Program w/ BBC coverage in Albanian (Satellite connection)

08.40 "Greek Lessons" – in cooperation with the Hellenic-American University.

09.00 English Program w/BBC coverage in English (Satellite connection)

10.00 French Program w/RIF coverage in French (Satellite connection)

11.00 Spanish Program (Satellite connection)

12.00 German Program (Satellite connection)

12.30 Russian Program (Satellite connection)

13.00 «WITH RHYTHM» with Maria Koutsimbiri and Al. Pontikakis
Every Friday «INTERNATIONAL MIGRATION ORGANIZATION» Daneil Esdras presents issues pertaining to migrants

14.00 «NEWS WITHOUT DISCRIMINATION»
Informative news program on issues concerning migrants with Christos Pagonis

15.00 «DROMO PAIRNEI, DROMO AFINEI
A crossroads and meeting point program hosted by Agni Ztroumbouli

ERT Top Links

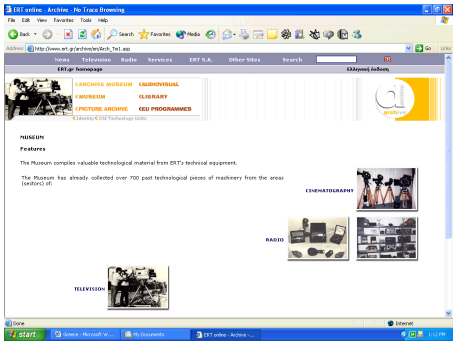
Back on the ERT homepage, near the top, are several more links. "Radio" allows you to see webpages in English from each of the 11 stations/streams already covered above. ERT S.A. provides you with the history and mission of the broadcaster (Hellenic Radio was established in 1938). "News" gives you a dropdown menu offering 10 categories, including "Weird." This takes you to the PECULIAR page with news stories such as the plights of the honey bees and polar bears. Unfortunately, most of the stories weren't translated into English. Under "Services" you can select "Arrivals/Departures A.I.A" for the Athens International Airport schedule.

There's one more place where you can use your username and password. Leave the ERT homepage and go to another ERT page, such as by clicking the ERT S.A. top link. On this page, go to the "Other Sites" top link and from the dropdown menu select "Travelling around Greece." When you land on the next page, go down to your right and find the two boxes and log in. Now go to the right toward the top of the page and punch the red "web cams" link. A series of photo-images of places around Greece will appear, which you can click for webcam views (just keep clicking pictures and you'll eventually get there).

(On the ERT homepage, when you go to the "Other Sites" top link, "Travelling around Greece" doesn't appear in the dropdown menu.)

ERT Archive Museum

On the ERT homepage, if you go again to the ERT S.A. top link and select "Archive" from the dropdown menu, you'll find a page in English introducing the ERT Archive Museum. Its function, made up of three departments – the Museum, the Picture Archive, and the Audio-visual Archive – is to preserve ERT's cultural history.



The museum collects technical equipment from ERT's heritage in the areas of cinematography, radio, and television, with over 700 pieces accumulated so far. The picture archive houses over 300,000 negatives, and a special section of prints dating from the start of the 20th century to 1940. The audiovisual archive has several thousand reels of film and 2000 video tapes. The audiovisual section also has labs for the maintenance, restoration, and classification of old movies on film. Additionally, the labs copy film to analog and digital video, and restore old technology video tapes.

ERT has a library, too, where it holds issues of its magazines, *Radioprogramma* and *Radiotileorasi*, some going back to the founding year of 1938. The library also contains scripts, historical documents, and technical reports, etc.

Though the ERT Archive Museum isn't an online museum, there are several photo-image samples on the webpages of what their archives contain.

The CapMed Site

If you click the EU PROGRAMMES link on the ERT Archives page, you'll arrive on a page that tells you about the CapMed Network. This is a program to collect and preserve the television heritage of the Mediterranean region, drawing together the archives of all Mediterranean public television broadcasters, ranging from Morocco to Palestine.

There is a link to the CapMed site

(**www.cap-med.net**) on the ERT EU PROGRAMMES page. On the CapMed opening page, click "Welcome," and you'll find a very English-friendly website (mostly in excellent English). On this homepage are three photo-images: Portrait of the month, Mediterranean cities, and Mediterranean links. The featured topics were French architect Le Corbusier; the city of Alexandria; and Sufism, or mysticism in Islam. Each topic/link leads to an article page, which is rich with other links and information.

The main function of the CapMed site is to provide a searchable database of programs carried by Mediterranean public television broadcasters. You can then order the programs on VHS.

No Podcasts

Though I could find no podcasts lurking in amongst the ERT or VOG webpages, the "EPT online – Live Radio" window with the Media Player is a handy feature. It's a snap here to listen to VOG live and to sample any of the other 10 ERT streams. And even without the option of podcasts, the sheer sprawl of ERT's online presence, amounting to almost a virtual Acropolis, surely earns them the right to boast of "My Big Fat Greek Website."

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Now you can listen to more than 15,000 streaming radio stations from around the world! Famous networks like the BBC and NPR; international shortwave stations; talk show and music broadcasters of every imaginable kind; even scanner traffic like police, fire and EMTs from metropolitan action centers! Simply plug any of these units into your Internet phone line, or invisibly join your wireless network from anywhere in your home or office—no computer needed.

Choose from these feature-packed Grace receivers:

ITC-IR1000 ($174.95)
Four-line LCD display presents information on free Pandora stations (song, artist, etc.) as well as premium Sirius broadcasts; Memory presets for up to 10 of your favorite station settings; tune in sports and weather by location; intuitive, easy-to-use controls let you browse Internet radio stations with ease. Wirelessly stream your MP3 music library from your PC or MAC using standard 802.11 protocol. Stereo interconnect jack for your home stereo; built-in audio equalizer. Clock allows choice of alarm settings. Compact (less than 10″ wide), lightweight (5 lbs.), powerful 4.5 watt internal speaker; headphone jack. 120VAC power supply included.

GDI-IR2000 ($194.95)
All the fine features of the IR1000 plus full-function remote control, external audio input, stereo interconnect cable for your home stereo system.

GDI-IRP600 ($194.95)
Most of the fine features of the IR1000 with these exceptions: No Sirius, Pandora or MP3 capability, no audio input jack; speaker power is 2 watts and the LCD is a 2 line display. It does have these added features: Remote control, battery power (6 AA cells required for up to 24 hours playing time) as well as AC power; built-in FM radio with 5 station presets; 6-3/4″ wide, 2.2 lbs. wt.

GDI-IR3020 ($239.95)
All the fine features of the IR2000 plus an iPod dock and ethernet port. Modernistically styled; 11″ wide.

For more information on these fine WiFi Internet radios, visit our website at http://www.grove-ent.com/wifireceivers.html

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RX-320D

LISTEN TO THE WORLD ON YOUR PC! **NOW USB READY!**

General coverage from 100 kHz – 30 MHz. “Black box” receiver connects to your PC via serial port or USB connector. Your PC provides the operation horsepower. A 12 kHz I-F output is included for decoding DRM transmissions with your PC sound card (user supplies decoding software). Download the actual operating software from our website for a pre-purchase test drive. **$369**

RX-320D

RX-340

USED BY GOVERNMENTS WORLDWIDE!

HF SWL receiver, 5 kHz – 30 MHz. IF stage DSP. Sync AM/selectable sideband, SAM, AM, SSB, ISB, CW, FM. Over 90 bandwidth filters, programmable AGC, built-in high stability TCVCXO. Completely remote controllable via RS-232 interface. DRM ready, no modification needed (user supplies decoding software). 90-264 VAC operation. **$4,250**

RX-340

1254

KIT BUILDING IS A WORLD OF FUN!

Build your own HF SWL receiver with our model 1254 shortwave receiver kit. 500 kHz – 30 MHz coverage in 2.5 kHz steps with clarifier control allowing tuning of all frequencies. LED digital readout. AM, SSB, CW capable. Complete step-by-step instructions and all components included. See our website for information on other available kits! **$195**

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TEN-TEC

Grace: A Life-Changing (Internet) Radio

By Mike Meenan

Even though I had hinted rather broadly that I was interested in acquiring an Internet radio, I was still surprised to find a Grace ITC-IR1000B under our Christmas tree. My wife is not an expert in these things, but she did her research online and found a unit with good reviews and a relatively low price tag – under $200. Little did I realize what a constant companion this little radio would become.

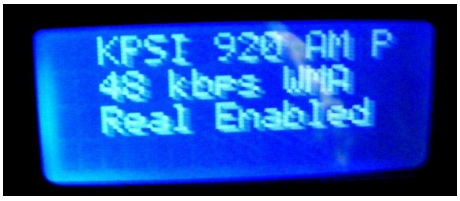
I had resisted buying an Internet radio, partly because of the perceived high prices and warnings about frequent signal dropouts due to buffering, etc. But the Grace turned out to be easy to install and set up, and the dropouts

have so far turned out to be minimal.

We live in the San Francisco Bay Area now, but for more than 25 years I was a radio news director in the desert resort of Palm Springs. Fortunately, the station that I used to work for, KPSI, recently began streaming its signal live on the Web. The stream came through loud and clear, and I assigned it to one of the five pushbuttons on the Grace (the major drawback of the unit – more are needed!). Now I can listen daily to morning show hosts Stan Layne and Steve Kelly and my successor in the newsroom, Gene Nichols, keeping me up on the happenings in my former hometown.

A news junkie's fix

But that was just the beginning. I soon assigned the other pushbuttons to KNX in Los Angeles, WCBS in New York, the BBC and Al Jazeera (audio from the English-language TV network). I quickly learned that I had tapped into a whole new source of domestic and international news. WCBS provided exciting coverage of pilot Chesley Sullenberger's miraculous landing in the East River, saving 155 lives. When London was hit with a historic snowstorm, the news-talk outlet LBC fielded calls from local residents trying to cope.



During the three-week assault on Gaza by the Israeli Defense Forces, Al Jazeera had the only foreign correspondent inside the enclave, and while the network clearly had a point of view on the crisis, their coverage was unmatched. Al Jazeera is not available through our satellite TV provider, but the audio was still exciting, and thanks to the Grace, there was no need to turn on the computer to access it.

When the bush fires in Australia started making international news, I wondered if there were a local news/talk station in the affected area. This time, I did turn on the computer and clicked on Radio Station World (**www.radiostationworld.com**), a great directory, and found 3AW 693 in Melbourne. Fortunately, the station's stream is available through the Reciva portal used by the Grace, and I pulled in the station on Black Saturday, just as the news started to come in about the terrible loss of life in the mountain resorts near the city.

I was filled with admiration as the station's weekend hosts, who usually talk about gardening and similar subjects, became crack news anchors. My admiration grew as I heard, through hundreds of calls coming in to the station, the community pulling together to help those in distress. I listened to that station exclusively for the better part of a week.

Back in the States, the record flood on the Red River brought me to KFGO in Fargo, North Dakota, where the station provided 24/7 coverage of the emergency for many days. Again, the entire staff, not just the news personnel, pitched in to keep the audience informed, and there also, the listeners all pitched in to help each other. Through the on-air phone calls, the station was able to send people where they were needed to fill sandbags to protect the city. If displaced families needed places to stay, that need was also met by others in high-and-dry areas who opened their homes to accommodate them.

Local radio's timeless value

In a shifting media landscape, the emergency situations in Melbourne and Fargo are reminders of how valuable local radio remains, serving not only as a source of information, but also as a calming influence as listeners connect with their familiar hosts and each other. The "we'll get through this together" sentiment was truly inspiring.

The only disconnect, perhaps, was that in both situations, the stations continued to run commercials. 3AW 693 had a funeral home sponsor whose spot ran fairly often, even as the death toll climbed with each newscast. In Fargo, a morning host expressed indignation one day that many businesses in town continued to operate instead of releasing employees from work to go fill sandbags. Yet the station continued to run commercials for restaurants, car dealers and other businesses.

However, as a veteran of local radio myself, I know that in an emergency situation, those commercial clusters often serve as breaks to allow the hosts and newspeople to gather and organize the critical information they're putting out. That's their first priority in an emergency, and the local audiences and sponsors seem to understand that.

A whole new world

Even when there's no disaster being covered, Internet radio offers an almost infinite variety of listening experiences. Miss your favorite station in your hometown anywhere in the world? Chances are, you'll find its live stream on the Web, and by extension, available to your Internet receiver. On a cold winter day, you can warm up, as I have, by "tuning in" stations in Miami, Puerto Rico and Jamaica.

I grew up listening to zillion-watt international stations on shortwave and still enjoy ham radio, so a part of me feels that listening to Internet streams isn't "real radio." While I'm confident that terrestrial broadcasters aren't going away anytime soon, Internet radio has indeed opened up a whole new world. Whether you're a news junkie like me – or just homesick – it's certainly worth a listen.

MT

HD-Radio's Long and Winding Road

By Ken Reitz KS4ZR

If you thought that the recent conversion from analog TV to digital TV was a nightmare, imagine a similar scenario happening to AM and FM radio. Actually, you don't have to imagine it, because it's happening right now. The victim of a struggling economy, underperforming electronics, and an indifferent public, HD-Radio, the industry's much hoped-for answer to satellite radio, has spent the last eight years shuffling along the digital highway.

Begun in 2001, iBiquity became the name for the industry consortium designed to bring all AM and FM radio interests (broadcasters, manufacturers and consumers) into the digital age. It promised "CD quality FM broadcasts and near FM quality AM broadcasts" in what would be known as HD-Radio. In addition, FM HD, like its digital TV counterpart, promised additional channels of niche programming (known as HD2 and HD3) that would complement the station's main music channel and offer competition to pricey satellite radio subscriptions.

Two years ago HD-Radio was riding a tsunami of hype that appeared to be building momentum. Manufacturers were pouring out new HD-Radio models faster than reviewers could test them. By March of this year it was reported that 1,000 FM stations were now transmitting second or third HD channels with 100 different HD-Radio models on store shelves.

Pay to Play Digital

But, the public relations push hid the problems faced by broadcasters, manufacturers and consumers. Unlike Digital Radio Mondiale (DRM), the open-sourced digital radio format favored by shortwave broadcasters, HD-Radio is a proprietary digital system that secured the blessings of the FCC to become the industry's *de facto* digital standard. iBiquity requires any station wanting to join the digital age to pay the company, according to an iBiquity licensing fact sheet dated January 2009, a "one-time fee of $25,000… for the rights to broadcast the Main Channel Audio."

Under the agreement, stations are allowed to broadcast data associated with the main channel audio including call letters, artist/song title and program. But, stations must pay iBiquity in order to transmit additional data such as traffic and weather reports, stock market data or sports scores. Payment, iBiquity says, would be a "revenue sharing model" that would net iBiquity 3% of the revenue derived from selling the auxiliary data channel of each station each year.

The agreement also requires stations transmitting additional digital audio channels to pay iBiquity 3% of incremental net revenue the station earns from the additional digital channels each year. The minimum paid, in the case of noncommercial stations, would be $1,000/year per station. The fee would rise according to how much revenue the station could make.

Those are just the fees and do not include the actual hardware required to put out a digital signal. That can cost a station an additional $100,000. Stations operating translators and repeaters must buy extra HD transmitter hardware (exciter and antenna), so that a station licensed to broadcast its main signal and two translators will have to buy $300,000 worth of HD-Radio gear. Given this business plan, it's easy to see why smaller stations, low power FM stations, and AM stations in particular, have balked at signing up.

Manufacturing Fits and Starts

During the push to put HD-capable radios in consumers' homes, manufacturers endured a nightmare of production delays and unreliable chipsets. While many name brand companies rushed products into the market, some notable brands stayed out, and missed being involved in what became a marketing fiasco. Of the seven table-top HD-Radio sets reviewed throughout 2007 in *MT*, four are no longer available, two have had makeovers, and only one remained unchanged. Here's how the brands and models previously reviewed have fared.

Boston Acoustics' Receptor HD and **Radio Shack's Accurian HD**, both sold at Radio Shack, were discontinued and sold at clearance prices in the run-up to last year's dismal Christmas shopping season. The Boston Acoustics Receptor HD, which originally had a MSRP of $300, was selling for $90 at Radio Shack stores in November last year. With the $50 HD-Radio rebate, which was still in effect at that time, those who bought the clearance Receptor HD actually paid only $40. Radio Shack now carries two newer models, one by Jensen (JiMS-525i at $150) and one from Gigaware (12-551 model at $130) both with iPod docking built-in.

CambridgeSoundWorks' 820HD, originally selling for $300, was discontinued after the initial production run was sold out. A spokesperson for Cambridge SoundWorks insisted that the product sold well, but added that the company has since decided not to make additional standalone HD-Radios. The company said it has yet to determine if they'll add any HD-Radio products in the future.

Gigaware 12-551 HD-Radio with iPod docking station is sold at Radio Shack ($130). (Courtesy: Radio Shack)

Polk Audio's I-Sonic, originally $600, has been replaced with the I-Sonic ES2 which has added an iPod docking station and dropped the price to $500 on their web site (**www.polkaudio.com**.) which, at this writing, was offering an additional $100 off.

Jensen JiMS-525i HD-Radio with iPod/iPhone docking station sold at Radio Shack ($150). (Courtesy: Jensen)

Radiosophy, a start-up company that had planned to cash-in early on HD-Radio, found that their first product, the **MultiStream HD**, though an award winner at the Consumer Electronics Show (CES) in Las Vegas in 2006, had so many production

Acoustic Research ART7 another lower priced HD-Radio with iPod docking ($180). (Courtesy: Acoustic Research)

iLuv iHD171 clock radio with iPod docking ($250). (Courtesy: iLuv)

problems they scrapped the product. Instead, the company brought out the **HD-100**, a small, desk-top HD-Radio which a spokesperson for Radiosophy says has been a big seller for the company. That's thanks to an agreement with National Public Radio to make the product available to affiliate stations as a premium to listeners pledging money to the local station. It still sells for $100 on their web site (**www.radiosohphy.com**).

JBL's OnTime 400iHD offers iPod docking ($300). (Courtesy: JBL)

Sangean's HDT-1 component HD-Radio tuner was replaced by the HDT-1X which now offers digital audio output via fiber optic cable and analog pass-through tuning for $250. A number of the original HDT-1 models are still available through Crutchfield, a national mail-order electronics store, for $200 (**www.crutchfield.com**).

Sony's XDR-S3HD, originally selling between $200 and $250 is also no longer in production though the company now offers the XDRS10HDiP, a table-top HD-Radio with iPod/iPhone docking capability for $160.

Sony's XDR-S3HD replacement is the XDRS10HDiP that gives you HD-Radio reception and has a built-in iPod/iPhone docking station. ($160) (Courtesy: Sony)

Polk Audio's I-Sonic ES2 now with iPod/iPhone docking station and lower price ($500). (Courtesy: Polk Audio)

The second generation of HD table-top sets has emerged with two notable features. They are all lower priced than their predecessors and they all have iPod docking ports that allow consumers to play an iPod MP3 player through the radio. The docking port serves to charge the iPod's battery, lets the radio's remote control operate the iPod functions and allows "iTunes Tagging," a demonstration of Apple's genius when it comes to marketing.

When a consumer hears a song on their HD-Radio, that they want to add to their iPod collection, they simply press the "Tag" button on the radio's front panel. The next time they plug their iPod into their computer's USB port to connect to the iTunes web site, that song is loaded onto their iPod and their iTunes account is charged 99 cents for each tag.

Where does this leave those who have generic MP3 players? Either shopping for an iPod (they start at $150) or, using the auxiliary input to hear their player and unable to use the tagging feature.

If you're thinking about buying an HD-Radio, pay close attention to on-line consumer reviews. Most major retailers such as Radio radios are "HD-Radio-ready." That means that an outboard converter must be added to be able to tune in. There are a number of converters available that range in price from about $100-$300. Remember that installation will be extra.

BRAKES ON FOR AUTO HD

If the auto industry was slow to embrace HD-Radio before the collapse of the economy last year, it's moving no faster now. According to iBiquity, no Chevrolet or Chrysler models offer HD-Radio options. Honda, Nissan and Toyota have also stayed away, while Ford, Lincoln and Mercury offer HD-Radio on nearly all models from 2008 to the current year. Audi will make HD-Radio options available in their 2011 models; BMW has made HD-Radio available from 2008 models on; Hyundai offers it only on the Genesis model; Kia will offer it on their 2010 models, and Mercedes has made HD-Radio available on certain models this year. HD-Radio is also available on the 2008 Mini Cooper, certain Volvo models from this year, and 2010 models from the Jaguar and Land Rover lines.

HD-Radio for your car is available in two ways: After market replacement or after market upgrade via a converter compatible with your make and model. (Courtesy: Kenwood, Pioneer, Jensen and Alpine)

So, if your new car doesn't come with HD-Radio or you'd like to up-grade your current car, there are two ways to do it: after-market receivers and after-market converters, both available through a large number of retailers. Shopping for price is a good idea, but shopping for installation might be a better idea.

For receivers, look for products from Alpine, Dice, Dual, JVC, Jensen, Kenwood and Pioneer. After-market HD-Radio prices range from Jensen's HD5112 ($150) to Kenwood's KDC-HD942U ($300). Some factory-installed

The Alpine converter is compatible with twelve 2008 head units and six 2007 head units. The Pioneer converter is compatible with all Pioneer HD-Radio ready units. Both feature iTunes tagging.

Shack, Crutchfield, Amazon and Best Buy offer reviews by their customers. To the retailers' credit, reviews are largely unedited even though they may be unflattering. Such reviews can help consumers differentiate between brands and models and they're well worth reading even if you're not planning to buy from that particular store.

Reception Ups and Down

The FCC has dubbed this time of analog and digital radio transmissions co-existing on the AM and FM bands as the "hybrid" period. Stations broadcasting HD-Radio signals do so along with their analog signals. But, early on it was discovered that normal transmission levels of the digital signal on both AM and FM caused interference to analog stations operating on adjacent frequencies.

To avoid wholesale mayhem, the FCC has required stations transmitting an HD-Radio signal to limit the HD power output to one percent of the station's analog signal. The result is that the HD-Radio signal dies out long before the edge of the analog contour. That makes listening to HD signals outside the immediate vicinity of the station difficult. Consumers have found that, like their digital TV counterparts, the fringe HD-Radio signal has frequent drop-outs as the receiver tries to lock onto the weaker signal.

Yet, if you live in a large metro area and have an HD-Radio, you probably couldn't be happier. In New York City, for example, according to the HD-Radio web page, there are nearly 50 stations broadcasting an HD-Radio signal, including some with HD2 and HD3 channels. Music ranges from Urban, Lite Classical, Jazz, Salsa, Deep Cuts Classic Rock, Gospel, Mainstream Country, Lite Jazz, South Asian, Hip-Hop, Oldies, Alternative formats – you name it. That sounds a lot like the XM/Sirius channel line-up. The Los Angeles metro area offers even more. But, outside the metro areas, in smaller cities, there are fewer stations and fewer alternatives

When will the FCC allow an increase in HD transmissions? NPR Labs, the engineering pioneer for HD-Radio and funded by the Corporation for Public Broadcasting, is now in the process of testing different power levels. To do so, several stations have received temporary authorization from the FCC to increase their power levels in coordination with tests being done at various metro markets around the U.S. The first tests were held in the middle of June in the Boston area and the next tests will be held in Minnesota. But, it's a painstaking process, and results may not be available for another six months, at which time proposals will be made and eventually the FCC will make a decision. Meanwhile, reception in the suburbs and countryside will be plagued with digital dropouts.

The FCC required that manufacturers design HD-capable radios so that when the digital signal drops out, the receiver automatically reverts to analog tuning. The problem is that if you're tuned to an HD2 or HD3 channel, and the signal drops out, the receiver reverts to the main analog channel which won't be the programming to which you had been listening. You can only wait for the digital signal to lock back on, and then manually retune for the HD2 or HD3 channel. As with digital TV reception, consumers have found that reliable HD-Radio reception, outside of immediate metro areas, may require an outside antenna. But, reception of HD-Radio in a car fares even worse. Outside the city limits the signal takes a nose dive and the small auto antenna of today's new cars is little help.

HD-Radio from Your Home Stereo

Tuning into HD-Radio on your home stereo or home theater system can also be done two ways. You can shop for an HD-ready stereo or you can convert your current stereo to receive HD-Radio signals. Most home theater stereo systems with HD-capability built-in are expensive. About the cheapest is Denon's DRA697CIHD at $900. Believe it or not, the price goes up from there through the thousands. A better way to get HD-Radio at home is to use an inexpensive converter such as Sangean's HDT-1X ($250) or Sony's XDR-F1HD ($100). Read the reviews.

This Yamaha is a big stereo with a big price tag ($1,400). It features built-in satellite radio, HD-Radio reception, iPod port as well as 7.1 home theater surround sound via 140 watts for all seven channels. Yamaha has an even higher priced model available ($2,700) (Courtesy: Yamaha)

It's also possible to use a cheaper HD table radio, such as Radiosophy's HD-100, as a converter for your stereo. By connecting the line audio output of the table radio to an audio input on your stereo you can enjoy the HD sound on your big speakers with a lot more power. With this method, it's best to use a fiber optic link into your stereo to get the full HD-effect. If your table radio doesn't have such an output, use a line output from the table-top set to your stereo. If there's no line output, use the headphone output jack.

Squandered Opportunity

The broadcast industry's initial interest in digital technology at the turn of this century was to combat the looming threat from satellite radio. But, it never anticipated even greater threats flying below their radar: the MP3 revolution, Internet radio and "smart phones." According to the Consumer Electronics Association, in 2004 some 7 million MP3 players, including iPod and all other players, were sold in the U.S. as young Americans discovered the value of carrying their favorite music in miniature handheld, solid state devices that let them record, store, swap and program their music the way they wanted it. In 2008 more than 44 million MP3 players were sold. You can see the trend.

Apple's new iPhone 3G S: It's a phone, an MP3 player, a GPS device and, with applications, it becomes a portable Internet radio. (Courtesy: Apple)

During that same time Americans have been tuning into Internet radio by the millions. They are listening not only to licensed AM and FM stations that are also streaming on-line, but to various web sites that style themselves as radio stations but have no actual on-air license or presence. This has brought rise to the manufacture of stand-alone Internet radios. Dozens of models and brands, all from China, are now available and selling under a variety of labels from $200 to $300. The same concept is quietly brewing with 3G smart phones such as the iPhone and Blackberry.

At a time when the economy is flat on its back and radio station revenues have never been lower and operating costs have never been higher. iBiquity, as of this writing, is no longer offering a $50 rebate for new HD-Radio purchases. But, that's just the sort of "stimulus" consumers need to get over the pain of buying new radios to hear the new content.

The National Association of Broadcasters (NAB), the lobbying organization for both the broadcast radio and TV industries, should accept a fair amount of blame for the messy DTV transition. Legal battles that dragged on for more than 10 years between the NAB and the National Cable & Telecommunications Association (NCTA), the cable industry's lobby group, did not advance the time-table for the digital TV transition.

The NAB has for years waged a similar legal war with satellite radio, engaging in everything from sponsoring blatantly anti-satellite radio bills in Congress to petitioning the FCC for relief from competition it knew was looming on the horizon. While these pursuits were legally theirs to take, the NAB continued to contribute to a painfully slow drift toward digitalization of the radio airwaves.

Most people in the radio industry believe it could be another ten years before there's a complete digital radio transition. At a time when the fiscal health of the broadcast radio industry is the weakest in more than 50 years, the NAB has risked the industry's future while new digital technologies gain consumer acceptance and set the standards and the pace of change.

Howard Hughes
Air Mobile Amateur Radio Operator!

By Linton G. Robertson

AROUND THE WORLD IN LESS THAN FOUR DAYS

After circling the top of the globe over three continents, Howard Hughes landed at his starting point yesterday, halving the previous record for the flight. The black line shows his course

Mention the name "Howard Hughes" in conversation, and you'll never lack for a response. Even 33 years after his mysterious and bizarre death, you'll immediately get a flurry of opinions on the man that run the gamut. Depending on who you speak with, he was either a master aviator of the first degree, a crackpot, an entrepreneur of uncommon ability, a pirate, an awkward lover, a lonely human being, a brilliant film producer, a financial mastermind, a ruthless businessman, an inventive braniac, or an insane recluse. There is probably enough evidence to give credence to all of these being true, though at very different points in his life.

But "Howard Hughes, Ham Radio Operator"?

Absolutely true. And he used his license and knowledge of ham radio to great effect in his record-breaking, round-the-world flight of July 1938. When he touched down on July 14, Hughes not only chalked up a new world record for a trip around the word (three days, nineteen hours, eight minutes), but he put another notch in ham radio's belt of accomplishments; during the entire time, fully ninety percent of the contacts attempted were successful, a feat that was undeniably fantastic at a time when the commercial stations found the going very tough. But before we get into the flight, let's backtrack a little first, and look at Howard's early fascination with radio.

Howard got his ham license in Texas in about 1918. He is credited with having erected Houston's first radio transmitter when he was eleven years old. Legend has it the young fellow, at 13, had a room of his house stuffed with radio gear. His call was "5CY", and he operated with an enviable 500 watts! With this, he could work the whole country and ships out at sea.

Remember, Howard started out with resources few hams had, as his father had a very successful business. The average ham station of this era was strictly lash-up, and made up almost entirely of car coils, magnetos, hand wound coils (some that looked like cinnamon rolls), pie plates, and other things "borrowed" from the basement, Mother's kitchen or the auto garage. When the time came for his famous 1938 flight, using ham radio to aid it must have seemed a natural to him.

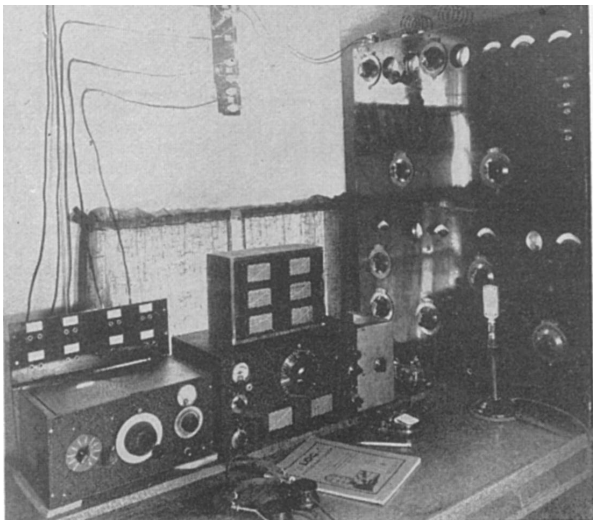
The airplane, obviously enough, had been equipped with the latest in apparatus, and was state of the art from front to back. Hughes turned the radio part of the operation over to one Charles D. Perrine, W6CUH. Charles spent a year designing and developing the special radio equipment for the flight, aided by Dave Evans, W4DUZ, who concentrated on the installation.

Their tireless effort (and, no doubt, a very large budget) proved overwhelmingly successful, as information on weather conditions, routine messages, technical reports on how the plane was operating and so forth were fed to the mainstream media of the day in a running account of the flight's progress that was unprecedented in its "up-to-the-minute" nature.

The plane's radio station was incredible for the time: it had three transmitters, four receivers and no less than six antennas. Talk about redundancy! The main rig, which was used for all communications, was rated at only 100 watts CW, as weight was definitely an issue. No kW rigs on board this Lockheed Super Electra aircraft!

Eighteen frequencies were used from 333 kHz to 23.1 MHz. A small, 15 watt CW 34-lb emergency transmitter and receiver accompanied the main units, and they were designed to float, should a ditch have to occur. Howard was trying to think of everything, but weight was vital.

Flight HQ at World's Fair, Flushing, Long Island, NY



W2UK at Quoque, Long Island, NY

Mixed Opinions about Ham Ops

In our present time of media blitz over every private attempt by a private company to reach space and return safely, it may sound odd that preparations for the flight were undertaken in the utmost secrecy. But back then, in a day and age when aeronauts were constantly trying to break every record on the books, Hughes ran the risk of someone trying to "steal the march" on him, had word of this attempted flight leaked out.

Ham radio operators at large were also kept out of the loop. There was another reason for this: during the Earhart disaster, ham radio operators got something of a bad rap with the aviation enthusiasts as a result of some questionable radio reports that got into the mainstream media and may have been amplified and distorted.* As such, a conscious decision had been made to keep everyday hams out of the information flow.

In spite of this, it's interesting to note that the hams involved directly in Hughes's effort could keep their mouths shut about the whole thing, when the hallmark of amateur radio operators, then and now, is to yak endlessly!

Three ham stations made up the entire ground network. Hughes' own aircraft, a Lockheed Super Electra, carried the call sign KHBRC. The ground stations were W2GOQ, W2UK (assisted by John Etter, W1DHE), and W6CUH.

The first station had an interesting lash-up: it was keyed by landline remote control from the World's Fair Flight HQ at Flushing, Long Island, NY, and run by Perrine. The second station was operated by Ralph Thomas, in Quoque, also in Long Island, and the third was operated by Dave Evans, W4DHZ in Hermosa Beach, CA, running Perrine's own home rig, W6CUH!

Each station had a "full gallon," i.e. a kilowatt to work with, an amateur's dream in those days. Confidential frequencies in the 40- meter and 20-meter ham bands were used, the 20-meter frequency for the day and the 40-meter band for night. It's worthwhile to note the aforementioned hams were rather prominent in the hobby at the time, and all were recognized and thoroughly seasoned hard-core DX contesters.

Going Global

Dry runs for this sort of thing were mandatory and for two weeks previous to flight, the three stations transmitted back and forth routine, low-level sorts of information, like weather reports. Finally, it was time for the main event.

Taking off from New York City, Hughes's plane used the very bottom end of 40 meters to maintain a good contact until about halfway across the Atlantic, when the skip zone problems reared their head. The west coast station, W6CUH, was pressed into service at this point, and solid contact was made on the first try. After that, though, things began to get a bit more difficult aboard the Electra.

Richard Stoddard, Hughes's main radio engineer, found he was spending a lot more time doing navigation and radio direction finding than he had originally planned. This meant a lot of difficulty in keeping ground skeds with the ham stations, and it was decided that, for the first part of the trip, the ground stations should be silent, and listen for transmissions from the Electra before transmitting.

This proved awkward, difficult, and ultimately unworkable, so a new procedure was implemented in which ground stations would call the plane continuously for five minutes past the quarter of each hour! Talk about a marathon! The long calls gave Stoddart, on the *Electra*, enough time to find the signal and shift the transmitter frequency appropriately.

Remember, although radio was at a fairly high state of development by this time, there was plenty that could, and did go wrong. Ionospheric HF propagation was poorly understood by today's standards. There were no digital readouts, drift-free receivers and transmitters, and all the gear was aboard a bucking, vibrating airplane with questionable heating. The sheer idea of near-constant communication from air to ground on an around-the-world flight was practically unthinkable.

As the flight wound across Europe and Russia, things got a bit sticky with keeping contact with the US ham stations. Europe and Russia were not very happy places at this time, but, nonetheless, Hughes often received weather reports via European hams who managed to forward them to the landing and refuleing sites any way they could get them there, sometimes by landline.

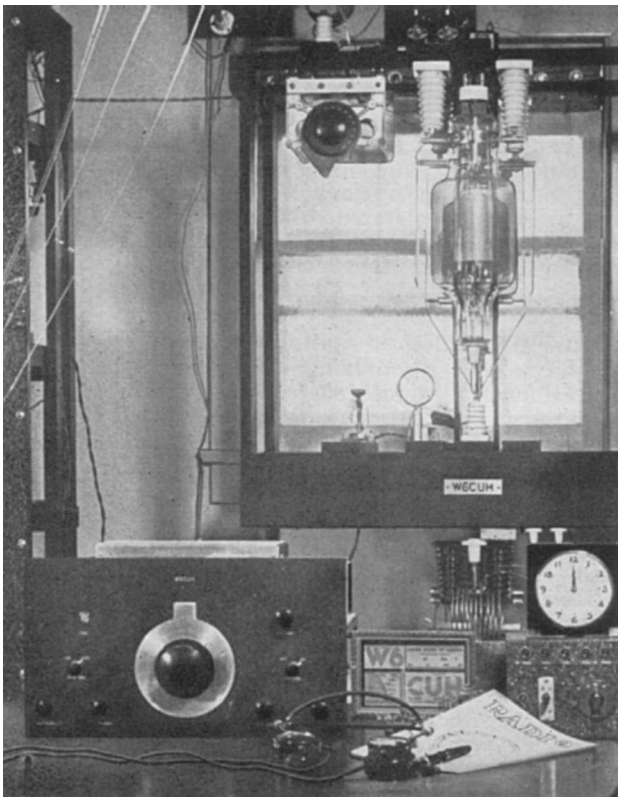
Dave Evans at W6CUH in Hermosa Beach, CA, showed considerable ingenuity in gathering up all the Siberian weather data he could get his hands on, skedding with K7PQ in Alaska, who, in turn, gathered what he had, and passed it back to Dave, who passed it back to flight HQ. The system worked so well that in some cases the weather info, when it reached flight HQ, was less than one minute old. In an age when firebottles (tubes) ruled and CW was the ideal way to punch through adverse conditions, this was an absolute marvel.

Hughes was very demanding about these weather reports, too. Nothing less than weather reports for the *entire northern hemisphere* were to be transmitted to him every single day of the flight. That 100 watt transmitter and the receiver, in particular, got a real workout.

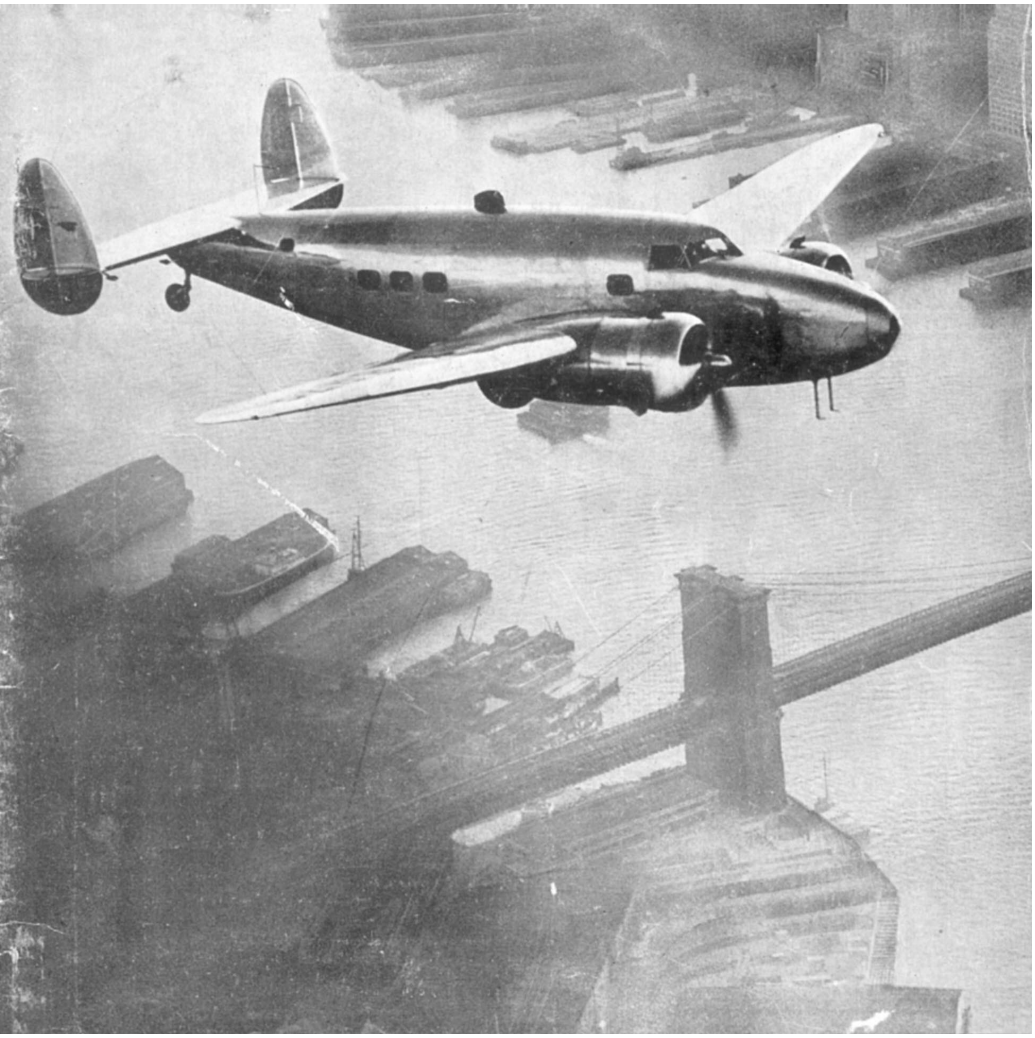
Overcoming Obstacles

On the plane flew. On the Moscow to Omsk leg, Hughes heard W6CUH, but W6CUH could not hear him. Perhaps the plane just didn't have enough of a signal; that 100 watts aboard the Electra might have been enough, but I speculate that the plane was probably putting out a lot less from its antennas than that. The 100 watts was probably rated at input power, not output power. What was coming out was probably somewhere around 65 watts. The antennas aboard, although numerous, were also probably not very efficient antennas, either.

Things proceeded to get a bit better, though, as Hughes, passing beyond Yakutsk and out into the Pacific Ocean, got within about five thousand miles of California. Two-way communications with W6CUH were firmly established. Radio traffic did not consist solely of technical matters and weather, but messages



W6CUH at Hermosa Beach, CA



The Lockheed Electra over NYC

to and from wives and husbands were passed as well, inquiring as to welfare, health, etc.

As a side note, it should be remembered that Hughes in the Electra was using both CW *and AM* for this period, while the ground station in California used CW exclusively. A 5000 mile hop from an 1938 airplane using AM, with probably far less power out than when in CW mode, and a compromise antenna is no mean feat; remember, it takes three to four times as much power to get the same results on AM as it does on SSB, which was not to come into general use until after WWII !

A Media Frenzy

On the leg from Fairbanks, Alaska, the old ionosphere refused to cooperate fully, and the only ham station that seemed to be able to work the plane at all was W6CUH. A few contacts were had with the Coast Guard and airways stations along the route, but they were short. Commercial stations were having no luck at all hearing Hughes's plane, but word got out that W6CUH could.

In a trice, a mob of newsmen descended on Hermosa Beach, and pandemonium raged outside the ham shack. The center of town teemed with news people from MBS, CBS, etc. One can only wonder what poor Dave Evans, manning the station, was going through, as the media probably tried squeezing in through the planks in the floor. Keeping his head while operating the station with the media clamoring outside must have been very trying. For a mercifully short time, Dave was being given the modern day "paparazzi" treatment.

History will always have its little joke, and this flight was no exception. At one point, through God-knows-what route, RF from the Hermosa Beach ham station got into one of the broadcast station's remote hookup and out into the national feeds. One US ham that had been following the news of Hughes's flight heard W6CUH's CW signal pounding through his car radio, assumed he had drunk far too many, and headed straight home to dry out!

Ham QRM was very infrequent. The very few stations that did drift too close to the plane's frequency skedaddled out of the way when warned. Oh, that we had this kind of manners on the bands today! (Can you pound out, "O tempora, O mores," at 13WPM?)

The Man Behind the Machine

When the Super Electra finally touched down in New York, Howard was mobbed. The scene was complete pandemonium. When he could finally get a word in at the main reception, he said, "It functioned because it was carefully planned." Nothing more said could tell you more about the man and the way his mind worked.

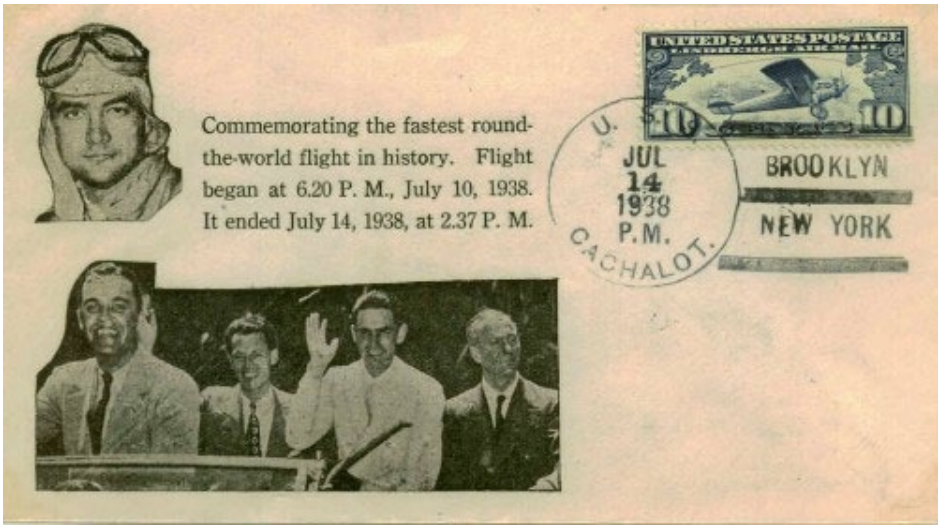
Planning was everything to Hughes, and an over-abundance of it may eventually have landed him in that post WWII Congressional hearing on the status of "The Spruce Goose," of which much more could be said. But Howard said, at that point, that he'd "put his life's work into this thing, and if it didn't work he'd probably have to leave the country."

Planning, planning, planning. To some, the man was a thing of gears, springs, and cogs. He wasn't about to leap without looking, probably several times. To others, his film producer's fascination with Rita Hayworth's, er, "charms" told the story of another Hughes, perhaps the one who proposed to Ginger Rogers (who turned him down).

After a disastrous accident in 1946 while piloting an experimental reconnaissance aircraft, Hughes seemed a changed man; he sustained significant injuries in the crash, including a crushed collar bone, 24 broken ribs and numerous third-degree burns. His personality became erratic and bizarre at times, getting worse as he grew older. One possible explanation was skull injuries leading to brain trauma, along with a dependence on opiates and painkillers thereafter.

No matter what your opinion of Howard Hughes, they sure aren't turning out any more like him. And there certainly won't be many red letter entries in the history of ham radio that will glow as brightly as his achievement in aero and ham communications on this history-making flight.

***Watch for more on radio communications and the Amelia Earhart flight in the October issue of** Monitoring Times - ed.*



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Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25.0000-54.0000 MHz., 108.0000-174,.0000 MHz., 400.0000-512.000. MHz., 806.0000-823.9950 MHz., 849.0125-868.9950 MHz., 894.0125-956.0000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker **ESP20** with mounting bracket & 10 feet of cable with plug attached $19.95. Magnetic Mount mobile antenna **ANTMMBNC** for $29.95.

Bearcat® BCD396T Trunk Tracker IV

Suggested list price $799.95/**CEI price $519.95**

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

Frequency Coverage:
25.0000-512.0000 MHz., 764.0000-775.9875 MHz., 794.0000-823.9875 MHz., 849.0125-868.8765 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning. **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** – 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAH Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. Unique Data Skip - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. Memory Backup - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. Manual Channel Access - Go directly to any channel. LCD Back Light - A blue LCD light remains on when the back light key is pressed. Autolight - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. Battery Save - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. Attenuator - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at www.usascan.com or call 1-800-USA-SCAN.

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Bearcat® BC246T Trunk Tracker III

Suggested list price $399.95/**CEI price $214.95**

Compact professional handheld TrunkTracker III scanner featuring Close Call and Dynamically Allocated Channel Memory (up to 2,500 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.72" Wide x 1.26" Deep x 4.6" High

Frequency Coverage:
25.0000-54.0000 MHz., 108.0000-174.0000 MHz., 216.0000-224.9800 MHz., 400.0000-512.0000 MHz., 806.0000-823.9875 MHz., 849.0125-868.9875 MHz., 894.0125-956.000 MHz., 1240.0000 MHz.-1300.0000 MHz.

The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at www.usascan.com and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** – Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group ID, custom search range, and S.A.M.E. group using 16 characters per name. **Memory Backup** - When power is lost or disconnected, your BC246T retains the frequencies that were programmed in memory. **Unique Data Skip** - Allows the BC246T to skip over unwanted data transmissions and birdies. **Attenuator** - You can set the BC246T attenuator to reduce the input strength of strong signals by about 18 dB. **Duplicate Frequency Alert** - Alerts you if you try to enter a duplicate name or frequency already stored in the scanner. **22 Bands** - with aircraft and 800 MHz. The BC246T comes with AC adapter, 2 AA 1,800 mAH nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. For more fun, order our optional deluxe racing headset part **#HF24RS** for $29.95. Order now at www.usascan.com or call 1-800-USA-SCAN.

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Eight Common Beginning Ham Myths

This month I'm taking a look at some common misconceptions that many hams, especially newer operators, have about HF operations.

Never Buy Used Equipment

A lot of hams believe the myth about used cars applies to used HF rigs. But, the myth about used cars is oversold. I've never bought a new car and mine are 25 and 31 years old. My HF transceiver, bought new as an ignorant Novice, has lasted 21 years.

Most hams are careful with their equipment. Rigs have always been expensive and hams are notorious cheapskates. That's a formula for making something last. Further, most equipment is so well made that, properly operated, you should get at least a decade of DX thrills from a used rig without serious problems.

And, finally, repair facilities are available that can return virtually any old rig to original factory specs. Like cars, it helps to know what to look for and what to avoid. While each individual rig is different, it's possible to generalize. You can see what experience others have had with the used rig you're contemplating buying by going to **www.eham.net** and clicking on "product reviews." Here you'll read critical reviews of nearly every type of ham radio ever made from people who have actually used the rigs.

You Must Have a Linear to be Heard

New hams often complain that no one hears their signal. They can try all day to break though a DX pile-up and don't; they often get poor signal reports when they check into an HF net; and it seems that no one ever answers their CQ. The answer has to be: more power! But, it's not. If you have a standard 100 watt HF transceiver, the reason your signal isn't being heard probably has nothing to do with power.

CushCraft A3S three element tri-band beam. At $640 from Universal Radio it gets more miles/$ than a linear amplifier and costs nothing to operate! (Courtesy: Universal Radio)

It could be operator error. Experiment with talking into the mic and have another ham give you feedback. You may be too far away from the mic or not talking directly into the mic. New rigs have amazing audio menus that allow you to tailor your "sound." Read the manual and have another ham critique the audio as you adjust it. If yours is an older rig, adjust the mic gain, processing and output power with another ham listening. They'll tell you when it's right.

Heil Proset microphone: Pricey ($140) but does the job. (Courtesy: Heil Sound)

It could be your microphone. Some stock mics sound "mushy" on the air. You can improve the audio of your station by changing microphones. Do on-air experiments and ask other hams (they'll tell in a heartbeat which is best and even faster which one is worse). Many hams have had excellent results with expensive after-market mics such as the Heil Pro series. I made my own "poor man's Heil" for less than $5 years ago and have had great reports on my audio ever since. You can do it too here: **www.arrl.org/members-only/tis/info/pdf/99hb2229.pdf** (you must be an ARRL member to download this article).

It could be your antenna. A poorly radiating antenna is a signal killer. Instead of investing in a linear, put up a better antenna. Consider buying a beam antenna. The CushCraft A3S is a very popular three element tri-band beam (10-15-20 meters). At about $600 it's also about the same price as a small linear amplifier. But, unlike the amp, the beam also improves reception. You'll be able to pick up the QRP (low power) operators as well as giving regular operators great signal reports.

Adding a linear to an already poorly radiating antenna turns you into an "alligator" – all mouth, no ears. The other downside to the linear is that the minute you turn on your amp, the power

The Ameritron AL811H is a standard ham linear amplifier. For $900 you get 800 watts out. (Courtesy: Ameritron)

company's meter starts spinning like a top. Your linear makes you keep paying and paying. The combination of improved operator practices, a better microphone, and a better antenna can give you an outstanding signal.

Beam Antennas are Too Expensive

Putting up a beam antenna can be really expensive. You'll be hard pressed to put up a bracketed 30-ft tower next to your house for under $2,000. Of course, you'll have to have a substantial concrete pad in place for the project. Add a rotator such as the Hygain CD45II, which will turn an A3S and a good sized 2 meter beam together, and it'll cost another $420. With lead-in and controller cables, it's tough to support and move a beam for under $2,500. Add the actual beam to the cost and you can spend $3,000 without trying.

I could afford the beam but not the rest, so I dispensed with the tower and the rotator, opting instead to use three 10 foot lengths of heavy

This Hygain antenna rotator can turn an antenna with an 8.5 sq.ft. wind load for $420. (Courtesy: Universal Radio)

duty antenna mast ($10 each at the time from the local Radio Shack) and a couple of sets of offset brackets ($5 each at the time) to attach the masts to the side of the two story addition to the house. I kept the mast clamping bolts loose enough to let the mast rotate freely by hand on all but one set of offset brackets. That set gets clamped tight when I rotate the beam in the direction I want. It's been up for more than ten years and through a number of tropical storm remnants, many ice storms, and quite a few fierce thunderstorms.

❖ Covenants Won't Allow a Decent Antenna

Many hams and shortwave listeners live in areas that don't allow outside antennas, such as gated communities, high-rise apartments, assisted living facilities, and dormitories. Unless you're in prison, you've made a choice on where you want to live, so you have to be resourceful in finding a way to get a signal out. Over the years I've worked many hams who live in town-house style apartments with nothing but a balcony for a yard; hams in high-rise apartment buildings with even less for a yard; even a kid in a prep school dorm, and they've all put out a signal.

Other hams have devised dozens of plans to compensate for lack of room. There are plans for attic antennas, stealth multi-band verticals, you name it, all from real hams who have taken the challenge of where they live and built on it. You can see what other hams have learned to do here: **www.dxzone.com/catalog/Antennas/Stealth**

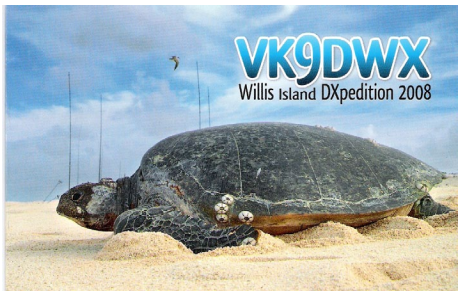
The ARRL web site has dozens of similar articles you can down load by using their web page search engine and *eham.net* has over 700 "antenna restriction" topics in their forums in which hams discuss what to do with limited space. You can read them all here: **www.eham.net/forums/AntennaRestrictions**. You have to keep in mind that all reduced-size antennas are a design compromise, and you shouldn't expect them to work as well as full-sized antennas, but at least you're on the air!

❖ Your Antenna Must Be High

We'd all like to be rich enough to afford a 200 foot tower festooned with stacked HF arrays and the like, but most of us live on small lots at best and are lucky to be able to accommodate a 150-ft long wire antenna and put it up 20 or 30 feet in the air. It turns out that, in most cases, that's all you really need. My offset-fed all-band wire antenna has been up for over 20 years at no higher than 25 feet and it does the job. I can work the local 80 meter rag chew nets or Antarctica on 20 meters. It's a versatile (and nearly invisible) antenna that's also very low noise and so makes a really great shortwave listening antenna. So, don't be obsessed by antenna height.

❖ With the Current Solar Cycle, Why Bother?

Last year was the bottom of what's turning out to be an abbreviated solar cycle. The sun was blank for more than 200 days. Still, I added a considerable number of DXCC entities to my



QSL card from Willis Island worked during the lowest part of Solar Cycle 24. (Courtesy: Author)

painfully slow-growing lifetime list, including Ducie Island and Willis Island (Oceana); China (Asia on both sideband and digital modes), Marquesas Island (Polynesia), Sierra Leone, Rwanda, Mauritania (Africa on both sideband and digital modes), Jan Mayen (Europe, above the Arctic Circle) and many more.

Notice they are all from different directions and some as far away from my station as you can get without coming back. I don't operate more than 50 watts on sideband and 25 watts on digital modes. This proves that, not only can you work the world at a time of low sunspots, but you don't need an amplifier or a beam (many DX stations were worked using an all-band wire antenna at 25 feet).

❖ Poor Propagation Keeps Me off the Bands

As long as a great number of hams believe there is little propagation and they stay off the bands, there's considerably less crowding and much easier operating for the rest. Many believe that poor propagation results in fewer "lids" (poor operators) infesting the bands, but anyone listening to 20 meters knows that's not true.

Still, even the worst propagation is an invitation to examine other bands and modes of operating. But, remember too that poor HF propagation doesn't affect some bands. This could be a good time to look at operating or monitoring the amateur satellites. While setting up a fully functioning AMSAT station can be an expensive proposition, you can start by listening. You probably already have the equipment to at least monitor the AMSATS.

You can learn all about getting started in AMSATs here: **www.amsat.org/amsat-new/information/faqs**. One of the most fun things

Who cares about HF propagation when you can monitor space? This is a photo of the ISS taken from the space shuttle in March, 2009. (Courtesy: NASA)

to monitor is the International Space Station. Find out where it is here: **http://spaceflight.nasa.gov/realdata/tracking/index.html**. Much of the activity (crew contact, voice repeater and SSTV) is downlinked on 145.800 MHz.

❖ CW is Dead and Digital Modes are too Hard

Anyone who feared (or hoped) that CW would die if it was not part of the amateur exam process should be amazed to see it very much alive and well at the bottom of each of our HF bands. Monitor the CW sub-bands during contests or DXpeditions and you'll find precious little room to crowd in your own signal. The old saw about CW getting through where nothing else will is true, and our current marginal propagation makes it a CW world.

Unlike CW, the digital modes are just in their infancy. While RTTY and SSTV are relatively old, new digital forms are coming along each year, including an HD version of SSTV and digital voice operation. The advantage of the digital modes is that they also work well during marginal band conditions; however, unlike CW, most are very easy to learn to operate. Most programs are free, easily installed and, since the computer program is doing all the heavy lifting, it takes no time at all to become a proficient operator. Within three months of beginning to work with RTTY and PSK31, I had worked more than 100 countries. Working those modes will also turn you into a better typist!

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Mobile Internet Radio
The push for portability

Those of you who have been reading GlobalNet since last winter have probably noticed I have spent some time talking about the players and technologies that are jockeying for position in the mobile Internet radio market. Well, things are really starting to heat up, and it has nothing to do with it being the middle of the summer.

In recent months, mobile applications like Pandora, Slacker, FlyCast, Moodio and Clear Channel's iheartradio have been increasing their reach to give mobile users more options than ever to tune into music from the palms of their hands.

Now, automakers are even jumping on board, converting cellular phone connections into in-car Wi-Fi hot spots that enable passengers to listen to Internet radio, watch videos on YouTube, update their Facebook page and more.

So what are the options at hand? What can you expect in the coming months? Let's take a look at Internet radio's portable side.

❖ Mobile Phone Applications

A big surge in the popularity of Internet radio has come from the development of mobile phone applications for those using smartphones like Blackberries and iPhones.

While the sheer number of applications available makes discussing them all out of the realm of this column, we can hit a few of the highlights and discuss the applications that are making waves in the way that people listen to music (or "radio") on their phones.

Pandora

Pandora has been discussed several times in my column before, and it may just be the forerunner to streaming music over mobile devices.

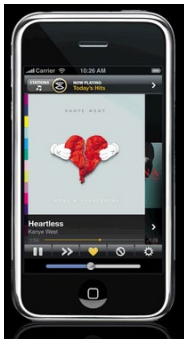
The secret to Pandora's success thus far has been its streamlined user interface and an advanced database of around 600,000 songs. Pandora allows users to enter artists or songs they like, and then Pandora takes it from there, suggesting other bands or songs that the user might enjoy, thereby programming a "radio station" based on each individual listeners' personal tastes. Users can then fine tune their musical preferences by giving a "thumbs up" or "thumbs down" to each song.

The upside to Pandora is a lack of audio advertising in between songs. The downside is Pandora's library of only 600,000 songs means there might be a lot of songs or artists that you might not be able to find.

Pandora applications exist for both the iPhone and Blackberry. In addition, many WiFi radios allow Pandora users to stream their stations through their radio. Check with your WiFi radio manual to see if this feature is available for your model.

Slacker

Slacker came along and made up for many of the shortcomings of Pandora. To begin with, it has more than 2 *million* songs in its library. Also, Slacker's programming seems to make stations that more closely resemble your personal musical preferences, at least it seemed to with my stations.



The biggest downside is that Slacker integrates quick ads and imaging into their stations. The imaging is quick and tasteful, but the advertising sticks out like a sore thumb. There is an ad-free alternative for those who want to subscribe to Slacker Radio Plus at $47.88 for an annual subscription.

Slacker has even released their own portable music player. The Slacker G2 Personal Radio Player allows users to stream stations from their Slacker account by use of a Wi-Fi hotspot or direct PC connection.

ooTunes

Those with an iPhone and an itch to stream broadcast radio stations from across the United States might want to get their hands on the ooTunes application. While ooTunes has many more functions, those reading this column might be most interested in its capability to stream broadcast radio stations on an iPhone.

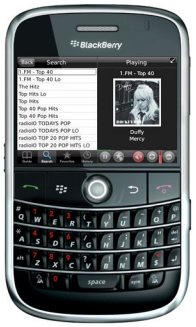
As of press time, ooTunes had nearly 10,000 stations streaming through their service. ooTunes also allows users to stream archives of thousands of live concerts, see the titles and artists of songs playing and recently played, even view lyrics to songs.

While Pandora and Slacker are free, ooTunes is a $4 download from the iTunes store.

FlyCast

This popular streaming service combines Internet-only radio stations with a handful of stations from markets across the country.

FlyCast combines an easy to use interface with nearly 1200 stations with formats ranging from Talk, to Blues, to World, to Sports, to Pop. Even those without a high-bandwidth EV-DO or 3G connection can enjoy FlyCast's services. (EV-DO stands for Evolution-Data Optimized or Evolution-Data only ... a telecommunications standard for the wireless transmission of data through radio signals, typically for broadband Internet access. *Wikipedia*)



RadioTime

Another source of streaming stations is RadioTime. RadioTime has partnered with several third-party services to provide streaming content on Blackberries, iPhones and Windows Mobile devices.

Keep your eye on RadioTime, as it seems to be partnering with some pretty heavy hitters in the wireless content industry and might soon position itself as one of the premier sources for Internet radio content.

As I mentioned, there are many more applications for both Blackberry and iPhone that allow streaming of broadcast stations and those "programmed" by users. A simple Google search is a good start in finding applications for your particular wireless device.

❖ Cruising the Net, in your car?

For those who have longed for the day when an Internet connection could travel with you in our car, your pining can cease.

Autonet Mobile has released the first device to deliver Internet service in vehicles, turning your mode of transportation into a hot spot that extends 150+ feet of your vehicle.

Autonet Mobile basically is an Internet service provider that uses 3G wireless signals

and converts it into a Wi-Fi hotspot, giving users download speeds of 400-800 kps. Those not able to access a 3G network can download through an EV-DO connection at 120-200 kps.

What does this mean for you? It means your wireless laptop, iTouch, PSP, or any other wireless device that can utilize a Wi-Fi connection, can access the Internet.

The big plus side of this for Internet radio fans is it can enable Internet-radio ready car stereos to stream stations using Autonet Mobile's connection.

Autonet Mobile's router has recently become an option for those who purchase a Volkswagen Routan, and it has already partnered with Dodge/Chrysler/Jeep for some of their vehicles and with Cadillac for their CTS.

In addition, you can purchase Autonet Mobile routers for your own vehicle. A 1-year contract is required for the service and 1GB of data will run you $29 per month, 5GB of data is about $59 per month. As of press time, the Autonet Mobile wireless router is going for around $395 on Amazon.com.

So those of you with a Wi-Fi enabled portable device like the iTouch and others, can run audio from the device through their current car stereo, thereby having Internet radio in their automobile.

And what of an Internet radio capable, in-dash car stereo? There is already one in the market.

Car stereo manufacturer Blaupunkt has teamed with miRoamer to create an in-dash car stereo capable of using a Bluetooth connection to sync with a 3G wireless device.

While you are still tethered to your wireless device to provide the Internet connection, if these two technologies can come together, imagine the possibilities for the Internet radio fan.

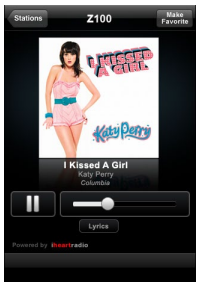
In addition, Pandora has recently announced that they have teamed with QNX, a leading creator of in-car software. The partnership could mean that Pandora could be making an appearance in automobiles that are equipped with QNX Car soon.

All-in-all, there are developments constantly coming on-line for the mobile Internet radio user. With talks of Apple's iPhone possibly coming to wireless providers other than AT&T once their initial contract expires in the first half of 2010, there could soon be even more widespread use of mobile Internet radio in wireless devices.

❖ Clear Channel gets help from artists

Struggling Clear Channel has turned to artists to create artist-programmed Web stations in hopes that it will generate more advertising revenue options in the current tight economic downturn.

Hit hard by dwindling revenue, Clear Channel is hoping that the so-called "artist personal experience" stations will get not only listeners, but advertisers to jump on board.



First to roll out their own stations are the Eagles, Weezer, and Christina Aguilera. The artists will program the stations with music from their own catalogs, including their personal favorites, commentary on the music, interviews and more. The artists will also receive a percentage of the advertising revenues.

The stations will be accessible from the Web sites of Clear Channel radio stations, as well as from each artists' Web site, and Clear Channel's iheartradio application for iPhones and Blackberries.

The stations hit the Internet in July and the radio company plans to add up and coming musicians as well as some of the bigger names in music in the coming months.

It is all part of a big push over the past five years by Clear Channel to bolster their online audiences and turn it into a viable advertising revenue stream. Recently, the company reports nearly 22 million users per month using their digital properties, so the push appears to be working.

A growing portion of that audience is turning to the iheartradio application on Apple's iPhone and various Blackberry models. Clear Channel is reporting 2 million downloads of the application and studies have reported that users are spending nearly 99 minutes a week listening to content on the application.

❖ Performance Royalty debate heats up

With lobbying on Capitol Hill in full swing on both sides, the Performance Royalty bill that is before Congress now is being brought to the attention of the FCC.

For those who haven't been following events, there is a bill before Congress backed by a coalition of musicians and the Recording Industry Association of America, to force terrestrial broadcasters to pay a per-song royalty directly to artists. Broadcasters have paid fees for years to song publishing companies such as BMI and ASCAP, but these were not on a per-performance basis.

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Members of the MusicFirst Coalition, the record label backed group leading the fight for more money, is accusing radio stations of refusing to play ads from the coalition and even refusing to play music from artists that support the coalition efforts.

While refusing to name which artists are being singled out for "boycotting," the coalition has filed grievances with the FCC and asked them to look into the matter.

Meanwhile the National Association of Broadcasters, a staunch opponent of the bill, claims another 15 members of the House of Representatives have vocalized their support for broadcasters in the debate. This brings the vocal support from Congress to 232 House members and 16 Senators as of press time.

GLOBALNET LINKS

Pandora - **www.pandora.com/**
Slacker - **www.slacker.com/**
Flycast - **www.flycast.fm/**
ooTunes iPhone app - **http://ootunes.com/app/**
RadioTime Wireless partners - **http://inside.radiotime.com/licensing/products-powered-by-radiotime**
AutoNet Partners with VW - **www.autonews.com/article/20090609/ANA05/906099985/1182**
QNX Car - **www.qnx.com/products/qnxcar/index.html**
AutoNet Mobile - **www.autonetmobile.com/**
Blaupunkt 600i Internet Radio Car Stereo - **www.wired.com/gadgetlab/2008/12/blaupunkt-and-m/**
Clear Channel's Artists Programmed Web Radio - **www.clearchannel.com/Radio/PressRelease.aspx?PressReleaseID=2442**

Dan Veeneman
danveeneman@monitoringtimes.com
www.signalharbor.com

Internet Expertise and Mobile Data

The Internet continues to provide a myriad of resources for the scanner listener. The combination of government databases and computerized mapping engines gives anyone with access to the Web a number of tools to locate and identify radio transmitters and their associated signals.

❖ Frequency Searching Process

Hello Dan,

I just read your Scanning Report in the 2009 June issue. Good information. I thought I'd pass along the process that I use to find a frequency. It's a three-step process, but if it's licensed through the FCC it should be found. I use ***maps.huge.info/zip.htm*** *to find the zip code for the area that I'm interested in scanning. Once the zip code is found, then I use* ***www.antennasearch.com*** *to search for the FCC licensed user (call sign) within the zip code (no amateur radio operators). I then use* ***wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp*** *to find the frequency that is FCC approved to the call sign. It sure beats the many hours of searching. I just thought that you'd be interested.*

Tony via the Internet

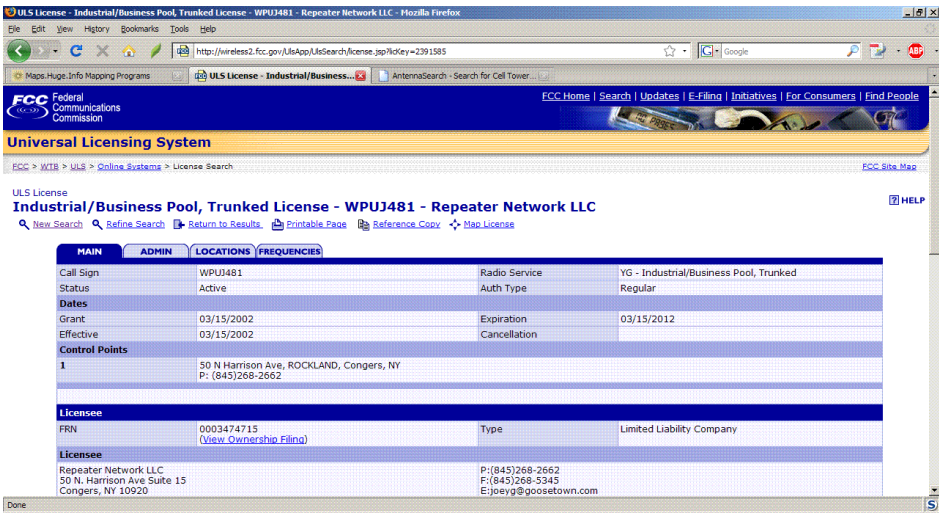
The Federal Communications Commission (FCC) web site provides access to a great deal of frequency, service, license holder and repeater site information from their Universal Licensing System (ULS) databases. The form at **wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp** offers a number of ways to locate and confirm frequencies.

The "Advanced License Search" selection allows you to search the FCC database by call sign, city and state of the license holder, or frequency range, to name just a few. This flexibility allows you to enter the information you do know to get back the data that you're looking for.

For instance, if you've come across an active frequency but don't know who it might belong to, you used to have to look it up in a printed frequency directory and hope that it was listed and that the listing wasn't too far out of date. These days you can go to the FCC web site and search up-to-date records for that specific frequency in a particular geographic area. ULS will tell you the call sign of the system, the name and contact information for the license holder, the location of the antenna site, and any additional frequencies that might be licensed under the call sign.

If you have a specific area you're interested in but don't know what frequencies might be active there, you can use **www.antennasearch.com** to locate towers and antennas within a given distance of any address. Results are presented as icons overlaid on a Google map, so you can see at a glance where the structure is located. Clicking on an icon reveals the owner, and a further click shows detailed ownership information, tower or antenna registration information, and the license history. Antenna results typically list an associated call sign, which can then be entered into the FCC ULS search form, as Tony suggests.

There are number of web-based mapping products, including **maps.huge.info** and **maps.google.com**. Nearly all of them will provide enough address information to satisfy the Antenna Search requirements.



❖ Eldred, New York

Dan,

To start with, I live in a small town in New York that has what I believe to be an LTR system out of Eldred, possibly operating as two systems off of one tower. It looks like there are four channels on one system and one on the other. I'm getting the burst on the channels listed, but they have an ID of 0-00-091 R30 on the burst only. When they talk I get nothing.

The only traffic (talking) I get is on 463.2375 which is a school bus company and an ambulance company. This is the only info I have on this system.

Do you have any idea what I can try next, to get this system into listening order so I can just listen to one, not all?

P.S. I use two radios to monitor: a BCT-8 and a PRO-97. Both of them are triple tracking scanners.

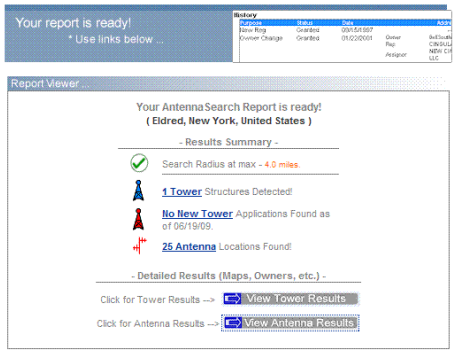
Anthony

Eldred is a small town in Sullivan County, New York, about a hundred miles northwest of New York City and fifty miles east of Scranton. The county borders Pennsylvania and is in the heart of the Catskill Mountains.

The frequency you mention appears under

call sign WPUJ481 in the FCC database and is licensed to a company called Repeater Network, LLC., based out of Congers, New York. Repeater Network LLC also appears as Goosetown Enterprises, Inc, both with the same address and telephone number in Congers. You can verify this in a couple of ways.

First, go to **www.antennasearch.com** and



enter Eldred for the city and NY for the state. Within four miles of Eldred the search finds one tower and 25 antenna locations. The tower turns out to be located just east of Eldred and is owned by SBA Properties, Inc. Clicking on the tower selection pulls up a satellite photo of the tower and an address on Mud Pond Road. Looking at the antenna results for that same tower reveals that several organizations share the structure, including the Sullivan County Division of Public Works and the Sheriff's Office. Clicking on Repeater Network LLC brings up ownership and transmitter information, including a call sign of WPUJ481.

Alternatively, we can go to the FCC ULS Advanced Search web page at **wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp** and perform the following steps:

1. Select New York as the Licensee state
2. Click the 'Exact' selection under 'Frequencies" and enter 463.2375 in the box.
3. Click the 'Search' button at the bottom of the page.

The search will return a number of entries, including one for Repeater Network LLC with a call sign of WPUJ481. Clicking on the call sign link will bring up the detailed record with four tabbed selections, shown as Main, Administrative, Locations and Frequencies. Clicking on the Frequencies tab will show a list of all licensed frequencies under this call sign. You can see that there are a number of frequencies for that call sign identified as appearing at a combination of fixed and mobile locations.

Clicking on the Locations tab will show the licensed addresses for each frequency. The primary fixed location is a 250-foot tower on Mud Pond Road in Eldred, which is licensed for five frequencies under the WPUJ481 call sign: 453.0125, 461.6625, 462.0375, 463.2375 and 464.8125 MHz.

The Repeater Network, LLC call sign also has ten frequencies licensed for mobile use within 32 kilometers (20 miles) of the Eldred tower: 453.0125, 458.0125, 461.6625, 462.0375, 463.2375, 464.8125, 466.6625, 467.0375, 468.2375 and 469.8125 MHz.

All of these frequencies are in what the FCC calls the Trunked Industrial and Business Pool and are typically licensed to private companies that provide commercial two-way radio services. Because the frequencies are licensed to the service provider and not the actual end user, it is sometimes difficult to determine exactly whom you're hearing.

❖ Logic Trunked Radio

Logic Trunked Radio (LTR) is one of the "big three" trunking technologies in widespread use in the United States. Unlike Motorola and EDACS, LTR systems operate without a dedicated control channel. Instead, an LTR repeater transmits control information over voice channels in the form of subaudible data, beneath the audio frequency range of human hearing.

When there is no traffic on a voice channel, the repeater will occasionally send a short data burst to inform the radios that the system is active and available for service.

Since the early 1980s when LTR was first introduced, several variations and enhancements have been produced. The most common variant is referred to as LTR Standard, which can be tracked by numerous scanners, including the Uniden BCT-8 and the Radio Shack PRO-97. Standard talkgroup identifiers have three parts, shown in the form of A-BB-CCC. The 'A' indicates an area and is either a 0 or a 1. It is used by the radio to distinguish between two nearby LTR systems. The 'BB' is a two-digit number between 01 and 20 that identifies the home repeater for a talkgroup. The 'CCC' indicates the individual group and can range from 001 to 254.

LTR Passport and LTR MultiNet are two other variants, but unfortunately there is no scanner currently available that can track them.

Reportedly, the Repeater Network, LLC system in Eldred uses LTR Passport, so if that is true, I don't think you will have much luck actually tracking activity on the system. However, the voice transmissions should be in analog form, meaning that if your scanner is tuned to the correct frequency you could hear them. You might try programming your scanner with each of the licensed frequencies

❖ Mobile Data Terminals

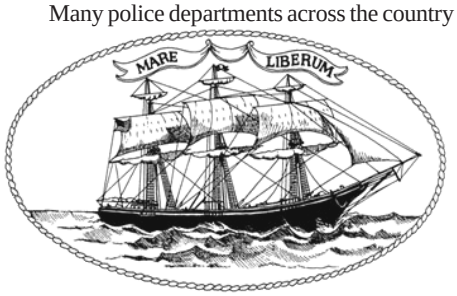
Dear Mr. Veeneman,

I have been a subscriber to Monitoring Times for many years. I have many scanners. I have some ham radios that I modified to do other things. Where I live in New London, they use mobile data terminals more than speech. Most of the information is sent that way and it would be nice to be able to read some of it. Do you know if they are ever going to come out with a scanner that can have a printer or monitor plugged into it that can show these messages?

Raymond in Connecticut

The City of New London is located on the shore of the Atlantic Ocean in southeastern Connecticut and is home to the United States Coast Guard Academy. It has about 26,000 residents in an area of just over 10 square miles, half of which is water.

Many police departments across the country



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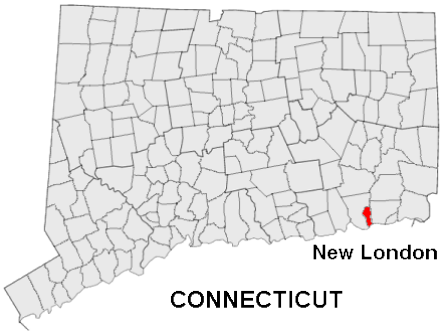


have Mobile Data Terminals (MDTs) installed in their patrol cars. MDTs are essentially ruggedized laptop computers connected by radio to a dispatch center. They allow officers to access motor vehicle and criminal databases without tying up a voice channel talking to a dispatcher.

The officer uses a keyboard to enter license plate and driver's license information, then submits a lookup request. The request is transmitted over the air to a dispatch center computer, where it is received and automatically processed. The resulting information is transmitted back to the patrol car, where the MDT displays it on a screen. Newer MDTs also allow officers to exchange text messages with dispatchers and other officers, again without using a voice channel or requiring the services of a dispatcher.

The radio link can be one of several types. Many MDTs use dedicated radio frequencies, although some are integrated with the department's trunked voice radio system and others, in increasing numbers, use commercial data services.

Equipment manufacturer Motorola was an early provider of MDT equipment and services. Many first-generation installations used in-vehicle Motorola terminals and a wireless data protocol called MDC4800, developed by Motorola in 1980 for use in public safety. MDC4800 provided an efficient frequency reuse plan, somewhat similar to cellular telephony, and supported acknowledgment of data delivery. The protocol transmitted data using two-level Frequency Shift Keying (FSK) at 4800 baud.

In 1990, a nationwide commercial wireless packet data service called ARDIS (Advanced Radio Data Information System) became operational. ARDIS grew out of a 1983 partnership between Motorola's Data Radio Network division and IBM to provide IBM's field service personnel with handheld data terminals that could receive assignments and order parts while enroute or on-site at a customer facility. ARDIS equipment used the MDC4800 protocol.

A second-generation protocol called RD-LAP (Radio Data-Link Access Protocol) was introduced into the ARDIS network in 1992. RD-LAP provides a data rate of 19,200 bits per second (bps) using four-level FSK and has a more efficient scheme for delivering data packets than MDC4800. It also incorporates more advanced error correction and retransmission mechanisms.

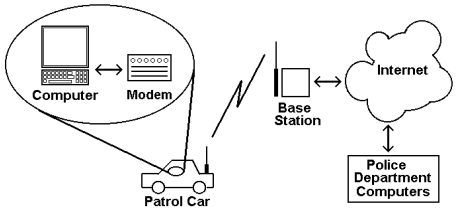
By 1998 there were 1,750 ARDIS base stations in most major metropolitan areas serving about 85,000 customers. Each coverage area had between one and ten channels, each 25 kHz wide in the 800 MHz band. However, ARDIS and its contemporaries, including Mobitex and Skytel, faded in popularity after the turn of the century under competition from cellular telephone providers who offered higher speeds and more extensive coverage.

Municipal MDTs

The first police department in Connecticut to install MDTs was Stratford in 1987. Since the late 1990s they have been using a Sprint-based cellular wireless network to provide their patrol cars with direct access to state and local information sources, but have recently been working with Verizon to switch over to a new Internet-based network. The town recognizes that this new network will require encryption and authentication in order to meet Connecticut State Police standards.

In the mid-1990s the towns of Groton Long Point, New London and Waterford installed MDTs that used Cellular Digital Packet Data (CDPD), a now defunct commercial wireless data service offered at that time by Bell Atlantic Mobile. CDPD delivered data over idle analog cellular voice channels at rates up to 19,200 bits per second.

Although service was introduced in 1995 and became popular in some areas, the sunset of analog cellular service drove the two major service providers, AT&T Wireless and Cingular Wireless, to shut down their CDPD networks in 2005. Existing customers were expected to migrate to the newer, faster digital data services offered by major cellular telephone companies. Ironically, one of the main reasons the Connecticut towns originally selected CDPD was because of its advertised potential for future technological improvements.



Mobile Data Terminal Network via the Internet

In 2006 the town of Colchester had only three police cruisers equipped with mobile data terminals. Today they pay about $5,500 a year for service on their nine MDTs.

Last year the town of Avon allocated $37,100 for the installation of mobile data terminals in fire department vehicles, in order to provide two-way text messaging and a map display with the location of the call and other department vehicles.

This year the town of Middleton approved the expenditure of $36,000 to upgrade the Police Department MDTs.

Connecticut MDTs

At the state level, several years ago Connecticut began a program to equip more than 800 of their Department of Public Safety vehicles with mobile data terminals and wireless modems on the then-Cingular (now AT&T) network, allowing officers to access criminal databases and complete incident reports from their vehicles. This access included the Connecticut On-Line Law Enforcement Communication Teleprocessing (COLLECT) and the National Crime Information Center (NCIC) systems. Each wireless modem costs $50 per month for service and support, resulting in a yearly cost of about $150,000 for a fully deployed MDT fleet.

By the end of 2006, the state police and nearly all of the municipal police departments in Connecticut were using MDTs.

Last year the state spent $1.5 million on technology upgrades for the Connecticut State Police, a portion of which was used to upgrade 217 mobile data terminals.

Police departments are not the only agencies using MDTs. In 2004, the Connecticut Department of Motor Vehicles (DMV) reported that 68 mobile inspection vehicles were equipped with a mobile data terminal. The MDT allows the inspector to access motor carrier safety information, including the Federal SAFER (Safety and Fitness Electronic Record) inspection systems, and quickly determine whether a truck driver or an 18-wheeler is in violation of state or federal law. More than 20,000 inspections of commercial trucks are performed each year.

The Connecticut Department of Environmental Protection (DEP) has seven MDTs that are linked to the DMV, also used to provide access to state and federal databases.

Looking forward, there is a new Public Safety Mobile Data System in the New Haven area. It operates in the 900 MHz band and is providing service for police and fire units in the City of New Haven. Unfortunately for listeners, press reports indicate the system will encrypt the data during transmission, putting it legally out of reach for monitoring.

Monitoring

Despite many agencies moving away from the older technologies and protocols, you may still find some departments using MDC4800 or RD-LAP on dedicated public safety frequencies.

At the end of 1996 the source code for a program that could decode MDC4800 transmissions on a personal computer appeared in an Internet news group. Some fixes and enhancements were made and by 1998 a Windows-based program called MDTW1234 was available for download that, with the right scanner, could show message traffic from MDTs using the MDC4800 protocol.

There has been some recent hobbyist-level activity in decoding RD-LAP transmissions, but so far there are no convenient software packages available that a scanner enthusiast can download and immediately monitor local data activity.

However, neither of these efforts have been incorporated in any commercial device, so the short answer is that there is no available scanner that can track or decode MDT traffic.

That's all for this month. Enjoy the summertime and when you're inside cooling off you can send me electronic mail with your questions, comments, and latest frequencies and talkgroups to *danveeneman@monitoringtimes.com*. You can also find more information about ARDIS and other packet data networks on my web site at **www.signalharbor.com**. Until next month, happy scanning!

ASK BOB

GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

***Q**. Much emphasis is being placed on clean energy like wind and solar, but the sun doesn't shine all the time and the wind doesn't blow all the time. Can such alternatives provide us with the energy we need to sustain the lifestyle we have become accustomed to?*

A. There are, of course, pros and cons to every alternative fuel. The only thing we all agree upon is that oil is not here to stay.

Variable resources like wind, water, wave action and sunlight have to be stored in batteries, and then converted to AC for distribution. Initially, we will be using alternative sources when available, and traditional oil when necessary, thus allowing a smoother transition.

So far as coal, the only way it can be kept clean is with much closer control of the industry than we have now. The big spill in Tennessee in December 2008 punctuated the dirty part of burning coal. Anthracite (hard) coal is relatively clean with little ash, but bituminous (soft) is filthy, both in burning and its leftover sludge. A century ago, the invention of the Cottrell precipitator, which electrostatically collects stack soot, cleaned up the air considerably, but the ash still needed – and still needs – to be disposed of.

Nuclear power is providing energy to a substantial percentage of the country with no problems in decades, but the public fear of disaster always looms. We've learned a lot about nuclear power and its safety controls, but there's still the problem of appropriate disposal of the radioactive waste from spent fuel.

Developments in biofuels – grains, algae – certainly deserve some attention as well. It's quite likely that we will utilize several alternative fuel sources before we settle on the most promising one(s).

***Q**. I built a Jacob's ladder [climbing spark generator] and hung a small chain from one electrode. Using a long insulator to prevent shock, I swung the chain toward the other electrode and it started the spark, then would swing back and forth as the arc would break and re-establish. The chain itself is magnetic, and so is the post I hung it from. Was the motion from the electromagnetic field of the spark? (Mark Burns, Terre Haute, IN)*

A. Probably not if the chain would draw toward the other electrode even when there was no spark. DC and low-frequency electromagnetic field intensity is referenced to ampere-turns, the product of the number of amps times the number of turns in the surrounding coil. Since there's no coil and the current is quite small, it's unlikely to have much of an influence on the chain.

An argument could be made that the two parallel electrodes of the Jacob's ladder and the arc between them would comprise one turn of a coil, or that the electromotive force (voltage – EMF) between the two electrodes drew the chain.

Try substituting a similar brass chain and see if you get the same thing; that should remove any thought that it is a magnetic effect, and add credibility to the EMF concept.

***Q**. Will an antenna tuner help shortwave reception? (John Bishop, Hawthorne, FL)*

A. An antenna tuner, more accurately called a transmatch, is a device which compensates for the impedance of an antenna and its transmission line so that it matches that of the transmitter or receiver, typically 50 ohms. With a transmitter, it means that less of the power will be wasted heating the insulation of the cable. With a receiver, it means that the incoming signal and background noise (atmospheric static from worldwide lightning storms) will be somewhat stronger than if it isn't matched. But there is little improvement to be gained by increasing the signal *and* the noise, since the noise will still be interfering with the signal. That's why antenna tuners are rarely used on shortwave.

***Q**. I have a length of RG-6/U coax with F connectors, and I have a PL-259 adaptor on one end and a BNC adaptor on the other. When I use it between my receiver and the antenna, I lose all signals. How do I determine if there's a short circuit in the line? (Bill Rathbun, email)*

A. This test is easy for any coax cable and adaptors if you have an ohmmeter (You can also use batteries and a bulb or LED for the test). With the coax removed from the receiver and antenna and not attached to anything, but with both adaptors on the ends, set the meter to the low ohms scale. Connect the test prods between the outer shell and the center pin of either adaptor (the PL-259 is the easiest). You shouldn't get any movement of the ohmmeter.

If the meter does swing across the scale, there is a short in the line. Remove the adaptors one at a time, repeating the test. If the needle still swings with both adaptors off, you have a short circuit in the coax.

Assuming that you don't find a short circuit, consider that it may be an open circuit – a break somewhere in the line between the two adaptors. It can be in the coax, or between the F connectors and the adaptor(s). To test that, short-circuit the center pin and shell of one adaptor with a piece of wire and make the test again from the other adaptor at the opposite end. The meter should full-swing on the scale, thus revealing the short you made.

If you don't get the desired short-circuit reading, remove the two adaptors and try the test again between one end of the coax and your short-circuit wire across the other end. If the meter still doesn't deflect, you have an open in the coax.

If you get the desired short-circuit reading, be sure the center wires at both ends of the coax aren't bent over, but are straight. Be sure as well that the center wires protrude far enough to insert into the adaptor(s); they should be at least flush with, if not slightly beyond, the open end of the F connector. If not, simply grasp the short wire with needle-nose pliers and pull on it while gripping the coax with your other hand. You may need to let your hand slip down the coax while gripping it to allow slippage of the wire.

***Q.** Years ago, yellow fluorescent lamps were common at snack shacks in order to keep the bugs at bay, but I don't see them anymore. Are these bulbs still made? (Mark Burns, Terre Haute, IN)*

A. Yes, they are still widely available at electrical supply houses. Most insects don't see the yellow part of the spectrum, so they aren't attracted; but the light doesn't repel them, so that's why more people now buy bug zappers which attract, then eliminate, the bugs.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)

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Hugh Stegman, NV6H
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Utility Broadcasting: Wireless Time and Power Control

This month we'll cover some of the more offbeat utility transmissions which are actually aimed at the public, or intended as part of the public infrastructure. Believe it or not, there are more of these than ever, as new technologies come into use.

We'll start off in the logical place, by looking at all those standard time and frequency stations you might have used to set your watch or even tune your piano.

It's About Time

The use of radio to synchronize timekeeping in remote areas or at sea is nearly as old as its use for communication. In 1907, before anyone had thought to call it "broadcasting," the Marconi Wireless coastal station in Halifax, Canada was already sending automated time signals.

These came over Western Union wires from the Meteorological Office in St. John, New Brunswick. Later, the responsibility for standard time signals went to the Dominion Observatory in Ottawa. Thus was born the station that continues today as CHU.

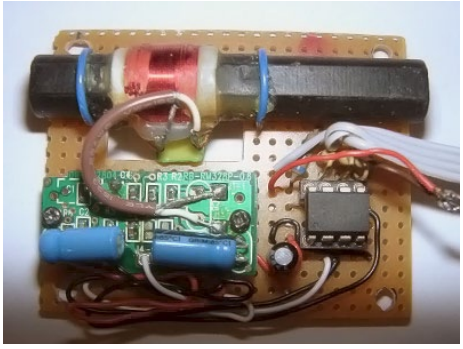
It's interesting to note, in passing, that one early use for wired and wireless time signals was to synchronize the release of "time balls." These were more utilitarian versions of the fancy lighted ball that drops every New Year's Eve in Times Square. They worked in a fairly similar manner. Electric signals would release a ball with a carefully measured falling time, and when it hit, that was the official hour for the day.

Radio time signals were quickly adopted by ships at sea to improve navigation by "sun shots." These could give both coordinates, but were only as accurate as the reading of the ship's chronometer.

Other time stations were quick to come on-air. France and Germany started theirs in 1910. An early incarnation of the US Navy's NAA powerhouse, at that time in Arlington, VA, started up a 100-kilowatt spark transmitter in 1913.

However, standard time and frequency broadcasts really came of age with the invention of practical atomic time standards. Various types have since been developed, each more accurate than the last.

Any clock is basically an oscillator and a counter, and so the same circuits can also be used to determine the station carrier frequency. Even after the ionosphere has done its worst, ordinary radio users can treat this as a calibration standard. Anyone who's ever used an old tube radio



A homemade receiver for German station DCF77 using the RF module by Conrad.

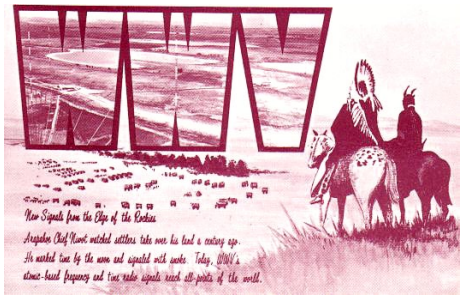
remembers how to zero-beat its crystal marker generator to a time station, greatly improving dial accuracy.

More recently, the space-based navigation systems such as the US Global Positioning System (GPS) have been used as a time reference. My car clock sets itself this way. For various technical and economic reasons, however, terrestrial radio remains the medium of choice in most normal applications.

Atomic Clocks?

Maybe you have one of those moderately-priced "atomic clocks" from the local electronic store. These are actually radio-controlled clocks. Some have analog "hands," while others are slick and high-tech. All work by periodically syncing to radio time stations. Most use standard receivers and decoding chips, which can be purchased separately for homebrew projects.

The first widely accepted device used plain old WWV, the US time station we've all come to know and love. It was the "Most Accurate



Clock" by Heathkit. However, the concept really took off in the mass market after the move to lower frequencies for time broadcasts. All of these low-frequency stations send out slow binary data streams. Most use one-minute message frames, with all kinds of information available for decode by computer programs and consumer clocks alike.

Of course, similar streams are often sent on the higher frequencies as well. The difference is that lower-frequency stations typically don't send anything else, except for an identifier in some cases. A section of the data frame is left empty for this.

Long Wave Stations

These stations broadcast in the lower half of the Low Frequency (LF) band from 30 to 300 kHz. This band is also known as long wave. It offers more stable and predictable signal propagation than our better known High Frequency (HF, also known as short wave, from 3 to 30 megahertz). This is especially true in Europe, where it is ideal for coverage of an entire country.

Of course, there have been some recent grumbles in the UK about their longwave station MSF, since its move from Rugby to Anthorn. Similar issues occur with WWVB in the United States, but for different reasons. This country is simply a bit large to cover with only one transmitter.

Russia, an even bigger country, does the job with several stations, including a cluster just below the long wave band. France, meanwhile, has its own unique system. TDF, its national time service, sends its data stream by slightly phase-shift keying the carrier of an otherwise normal long-wave broadcast station with high power and very wide coverage. This sub-channel is inaudible, though I think it shows up on spectrograms.

Europe's big gun, though, is Germany's powerful DCF77. It comes from the historic Mainflingen long wave site near Frankfurt. Its wide coverage and well-documented code give it frequent and wide use for a variety of applications, all over that part of Europe

Finally, there are two long wave stations in Japan, both identifying with the old JJY callsign. They are on separate frequencies, to avoid interference in that compact country.

High-Frequency Stations

Sadly for us, JJY has dropped its HF service. Other governments have also thought about cutting out HF for budget reasons. Surveys, however, have invariably shown that many people still want these and consider them useful. This knowledge has, in fact, saved several stations.

Not so lucky are the Australians, who find

themselves without a reliable clock-setting signal since the demise of the Navy's VNG. Similarly, the Italian IAM is gone, as is the Russian RID. Of course, Russia still has RWM. It's in continuous-wave (CW), offset 4 kHz below the usual HF time frequencies.

While Russia has an offset frequency for its HF service, BPM in the Chinese People's Republic has periods of offset time. This can sound pretty strange when the station is coming in under WWV or the others. It's too much for a propagation delay, and so it sounds like they've gone bonkers and started sending the wrong time.

Actually, it's the right time, but it's a different scale. Nearly all of these stations transmit Coordinated Universal Time (UTC), but BPM also sends UT1, a Universal Time scale popular with navigators. The two scales drift out of sync as atomic time diverges from astronomical observation. This is also the reason for the "leap seconds" we hear about. They keep UTC's atomic seconds in closer sync with the other Universal Time scales.

There are many other standard time and frequency stations. I've put together a pretty definitive list of these.

❖ Long-Wave Teleswitching

Another, lesser-known, radio broadcasting system is used by power companies for timing and load control. It's called Long-Wave Teleswitching.

This is basically a wireless implementation of an older signaling mode called ripple control. This latter mode uses the actual wires themselves. Receivers at the customer site control load-shedding or meter rate changes. This saves energy and strain on generating stations.

A radio used to receive power company teleswitching commands.

Ripple control isn't the Broadband over Power Lines (BPL) you might have heard of. Its bandwidth is extremely narrow, and the frequencies used are in the audio range. In fact, there are documented cases of buzzy audio resonances accidentally occurring in electrical devices near the sending end.

Long-Wave Teleswitching works exactly the same way, except that it uses the radio. Again, long wave's stable propagation makes it ideal. Europe and New Zealand have done this for years.

Western Europe has three dedicated stations, which cover the entire region. Ary Boender, a Dutch listener well known from his Numbers and Oddities Newsletter and Utility DXers Forum (UDXF), has often sent his reports of these stations to the *Utility Logs*.

Now, I have finally been able to hear them too, over the Internet. Thanks go to the amateur radio group at the University of Twente in the Netherlands, which made this band available on a special temporary version of its WebSDR (Software Defined Radio).

First is DCF49, again from Mainflingen, Germany. Its listed center frequency is 129.1 kHz, using frequency-shift keying (FSK) at the odd shift of 340 hertz. As always, your own indicated dial frequency can and will vary widely. The station idles on the lower mark frequency, sending periodic bursts every ten or so seconds.

Other stations are HGA 22, Lahihegy, Hungary, center frequency of 135.6; and DCF 39, Burg, Germany, on 139.0 kHz. Both use the same modulation and format as DCF 49.

Tom, DL8AAM, who is also no stranger to the *Utility Logs*, has done some good work on decoding these bursts. It turns out that they are straight ASCII (American Standard Code for Information Interchange). Format is 8 data bits, no parity bit, and one stop bit (8N1). Speed is variously reported as 200 and 300 baud. The message is in a standard datagram format which can be found at **www.qru.de/dcf39-beacon.html**

A similar role is played by the Radio Teleswitch Service (RTS) in the United Kingdom. Somewhat like the French time service, RTS uses a very narrow phase-shift keying (PSK) superimposed on the 198.0 kHz Radio Four service of the British Broadcasting Corporation. One can detect a low buzz at approximately 20 Hz.

The main transmitter, with 400 kilowatts, is at the historic long wave site in Droitwich, Worcestershire. Synchronous transmitters are used on the same frequency from Westerglen and Burghead to fill in coverage of Scotland and Ireland. The whole network can be heard throughout Western Europe, and quite a bit farther in good conditions.

We'll be back at a precisely measured time next month.

STANDARD TIME & FREQUENCY STATIONS

kHz	Call	Location	Comments
25.0	RAB99	Khabarovsk, Russia	0206-0220, 0606-0620 (1)
25.0	RJH63	Krasnodar, Russia	1106-1120 (1)
25.0	RJH69	Molodechno, Belarus	0706-0722 (1)
25.0	RJH77	Arkhangelsk, Russia	0906-0922 (1)
25.0	RJH86	Bishkek, Kirgizstan	0406-0422, 1006-1022 (1)
25.0	RJH90	Nizhni-Novgorod, Russia	0506-0522 (1)
40.0	JJY	Fukushima, Japan	Time code + identifier (ID) (2)
50.0	RTZ	Irkutsk, Russia	Off 2100-2200 (1)
60.0	JJY	Kyushu, Japan	Same as 40 kHz (2)
60.0	MSF	Anthorn, UK	Time code only
60.0	WWVB	Ft. Collins, CO	Time code, ID by phase shift
66.6	RBU	Moscow, Russia	Time code, ID H+5
75.0	HBG	Geneva, Switzerland	Time code only
77.5	DCF77	Mainflingen, Germany	Time code, ID H+19, 39, 59
162.0	TDF	Allouis, France	Subaudible time code (3)
2500.0	BPM	Xian, China	0745-0100 (4)
2500.0	WWV/WWVH	Ft. Collins, CO/ Kekaha, HI	(5)
3330.0	CHU	Ottawa, Canada	Reduced-carrier USB
3810.0	HD2IOA	Guayaquil, Ecuador	0500-1700
4228.0	CBV	Playa Ancha, Chile	5 min at 0055, 1155, 1555, 1955
4996.0	RWM	Moscow, Russia	CW (6)
4998.0	EBC	San Fernando, Spain	1030-1055 weekdays
5000.0	BPM	Xian, China	0745-0100 (4)
5000.0	BSF	Chung-Li, Taiwan	Off H+35-40
5000.0	HLA	Taejon, S. Korea	Off other freqs
5000.0	LOL1	Buenos Aires, Argentina	(7)
5000.0	WWV/WWVH	CO/HI	(5)
5000.0	YVTO	Caracas, Venezuela	Spanish ID H+40
7850.0	CHU	Ottawa, Canada	Reduced-carrier USB
8677.0	CBV	Playa Ancha, Chile	5 min at 0055, 1155, 1555, 1955
9996.0	RWM	Moscow, Russia	CW (6)
10000.0	ATA	New Delhi, India	Indian Standard Time, not UTC
10000.0	BPM	Xian, China	0745-0100 (4)
10000.0	BSF	Chung-Li, Taiwan	Off H+35-40
10000.0	LOL1	Buenos Aires, Argentina	1400-1500
10000.0	WWV/WWVH	CO/HI	(5)
10000.0	Unknown	Rio de Janeiro, Brazil	(8)
14670.0	CHU	Ottawa, Canada	Reduced-carrier USB
14996.0	RWM	Moscow, Russia	CW (6)
15000.0	BPM	Xian, China	0745-0100 (4)
15000.0	BSF	Chung-Li, Taiwan	Off H+35-40
15000.0	WWV/WWVH	CO/HI	(5)
15006.0	EBC	San Fernando, Spain	1000-1025 weekdays
20000.0	WWV	CO	No WWVH
25000.0	WWV	CO	No WWVH

1. ID H+6; Schedule moves forward an hour for Russian daylight saving time
2. JJY has dropped HF
3. Sent by phase-shifting a long wave broadcast carrier
4. Off H+10-25, 40-45; sends UT1 (not UTC) H+25-29, 55-59
5. WWV uses a male voice, WWVH female
6. 4-kHz audio beat with stations on 5, 10, 15 MHz; ID at H+39
7. One hour at 1100, 1400, 1700, and 2300
8. National Observatory, reported by Anderson, PY1VHF

UTILITY WORLD

UTILITY LOGS

Hugh Stegman

ABBREVIATIONS USED IN THIS COLUMN

AFB ..... Air Force Base
ALE..... Automatic Link Establishment
AM ..... Amplitude Modulation
CAMSLANT ..... Communications Area Master Station, Atlantic
CW..... On-off keyed "Continuous Wave" Morse telegraphy
E10 ..... Israeli AM female phonetic letters, call and message
E10a ..... All abnormal E10 identifier strings
E11 ..... English version of "Stritch/Oblique" family
EAM ..... Emergency Action Message
FAX..... Radiofacsimile
HFDL ..... High-Frequency Data Link
HF-GCS..... High-Frequency Global Communication System
MARS..... US Military Affiliate Radio System
NASA..... US National Aeronautics and Space Administration
NAT..... North Atlantic air route control, nets A-F
PHFER..... Pirate High-Frequency Experimental Radio
RTTY ..... Radio Teletype
SAR ..... Search And Rescue
SESEF ..... Shipboard Electronics Systems Evaluation Facility
SITOR-A..... Simplex Telex Over Radio, mode A
STS..... Space Transportation System ("Space Shuttle")
UK..... United Kingdom
US ..... United States
USAF ..... US Air Force
USCG..... US Coast Guard

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

2097.3 "A"-PHFER beacon, weak CW at 1019 (Jim W4JBM-GA)
2761.0 OSU-Oostende Radio, Belgium, marine information at 1845. (Michel Lacroix-France)
2872.0 Gander-NAT-C, Newfoundland, Canada, working aircraft at 0218. (MDMonitor-MD)
2899.0 Gander-NAT-B, working aircraft at 0224. (MDMonitor-MD)
3167.0 Juliet-Unknown station in multi-national Unitas Gold exercise, tracking link coordination with Delta, Oscar, and Sierra, at 0106. (Mark Cleary-SC)
3220.0 CHARLY46-Italian Air Force 46th Air Brigade, Pisa, calling 57, ALE at 1823. (PPA-Netherlands)
3449.8 "OK"-PHFER beacon, CW at 1000. (W4JBM-GA)
3476.0 Gander-NAT-F, working aircraft at 0200. (MDMonitor-MD)
3673.0 PBK-Netherlands Coast Guard, Ijmuiden, maritime information at 1853. (Lacroix-France)
4079.6 "TMP"-PHFER temperature (74 F) beacon, CW at 0957. (W4JBM-GA)
4149.0 WBN 3011-Crowley Maritime tug *Pilot*, working WPE, Jacksonville, FL, at 1235. (Cleary-SC)
4554.5 DLVH-German Coast Guard vessel *Emden*, working Cuxhaven in SITOR-A, at 0745. (Lacroix-France)
4555.2 Cuxhaven-German Coast Guard, SITOR-A information and weather bulletins to unknown vessel, in German, at 0654. (Lacroix-France)
4721.0 277183-USAF C-17A, calling HIK (Hickam AFB, HI), ALE at 0654. (Cleary-SC)
5598.0 Santa Maria-NAT-A, Azores, working aircraft at 0235. (MDMonitor-MD)
5616.0 Gander-NAT-B, sent unheard aircraft to 2971, at 0230. (MDMonitor-MD)
5696.0 CAMSLANT-Chesapeake-USCG, VA, working Coast Guard 2114 (an HU-25D), at 0202. (Stern-FL)
6575.0 HNCZ-Abnormal Israeli identifier string (E10a), callup only at 1900. (Mike-West Sussex, UK)
6628.0 Gander-NAT-E, working aircraft at 0242. (MDMonitor-MD)
6694.0 Tusker 313-Canadian Forces CC-130, patch to Greenwood Ops (NS) for SAR tasking, at 0140. (Cleary-SC)
6712.0 03-HFDL ground station, Reykjavik, Iceland, working D-ALCB, Lufthansa Cargo flight LH8251, a MD-11, at 1611. (MPJ-UK)
6742.0 CAMSLANT, position from HU-25 Coast Guard 2131, at 1451. (Cleary-SC)
6751.0 Cape Radio-USAF, Cape Canaveral Air Force Station, FL, working Booster Recovery Vessel *Freedom Star*, STS-125 launch, at 1255. (Allan Stern-FL)
6761.0 Ethyl 18-USAF tanker, refueling with Reach 267 at 2245. (Cleary-SC)
6840.0 ULX-Israeli intelligence (E10), mixing with EZI2, identifier and message at 2100. (Mike-UK)
6890.0 LEZSEE-German Coast Guard, Cuxhaven, calling BP24 (vessel *Bad Bramstedt*), ALE at 1216. (Lacroix-France)
7361.5 R25485-MI Army National Guard, calling T3Z238 (3-238 Aviation), ALE, also on 8181.5, at 2010. (Cleary-SC)
7377.0 "Oblique" family station (E11), preamble "748/34" and message, at 1100. (Mike-UK)
7527.0 LNT-USCG, raising 501 (a HU-25B) in ALE, then voice as CAMSLANT advising an unheard SAR aircraft, at 1325. (MDMonitor-MD)
7535.0 Gunslinger-US Navy, testing eight radios with Norfolk SESEF, at 1738. (Jack Metcalfe-KY)
7833.0 Cape Radio, radio checks with Track Star, then went to 10780, at 0409. (Stern-FL)
8000.0 "H-5-T"-Unknown Unitas player, net with "G-0-C," "A-1-D", others, at 1424. (Cleary-SC)
8020.0 50-Italian Air Force C-130J, working CHARLY46, Pisa, ALE at 1722. (MPJ-UK)
8137.0 Bel Ami-Caribbean Weather Center Net control, FL, working vessels at 1145. (Cleary-SC)
8156.0 C6LS-Royal Bahamas Defence Force patrol boat, position for Coral Harbour Base, at 1129. (Cleary-SC)
8337.6 Shark 07-USCG Cutter *Escanaba*, working HU-25 Swordfish 05, at 2202. (Cleary-SC)
8419.0 WLO-Mobile Radio/ Shipcom, AL, CW in SITOR-A marker at 1008. (W4JBM-GA)
8420.5 CBV-Playa Ancha/ Valparaiso Radio, Chile, CW in SITOR-A marker at 1013. (W4JBM-GA)
8422.0 NRV-USCG, Guam, CW in SITOR-A marker at 1015. (W4JBM-GA)
8816.0 10607-Russian Navy aircraft, working RJF94 (Central Section Control, Moscow), CW at 1455. (MPJ-UK)
8834.0 A7-ADX-Qatar Airways A321, flight QR0250, HFDL position for Johannesburg at 1907. (MPJ-UK)
8892.0 Offutt-USAF, NE, patching US Marine Corps tanker Ranger 18 to maintenance, at 1814. (MDMonitor-MD)
8912.0 MFN-USCG Cutter *Knight Island*, calling Z13 (USCG Sector Key West), ALE at 0544. (Cleary-SC)
8971.0 Golden Hawk -US Navy, Brunswick, ME, working P-3C Trident 62, at 1827 (MDMonitor-MD)
8983.0 CAMSLANT, SAR with Coast Guard Rescue 2135, at 1950. (Stern-FL)
8992.0 Stick Ball-US Military, repeating a 28-character EAM after HF-GCS, simulcast on 4724 and 11175, at 1433. (Jeff Haverlah-TX) Cape Radio, calling NASA 500 (confirmed NP-3D on shuttle landing photography), no joy at 1604. (W4JBM-GA)
9010.0 Halifax Military-Canadian Forces, passing message from Rescue Coordination Centre to CH-149 Rescue 908, at 1221. (Cleary-SC)
9025.0 501-USCG HU-25B, raised ADW (Andrews AFB, MD), for a patch to Miami Ops for SAR tasking, at 1357. (MDMonitor-MD)
10236.9 "ECHO"-PHFER beacon, weak CW at 1021. (W4JBM-GA)
10538.6 Shark 20-USCG Cutter *Resolute*, clear and secure with Shark 03, at 1938. (Metcalfe-KY)
10780.0 High Therm Control-Unknown, telling NASA 500 it's go for Edwards AFB, at 1340. (W4JBM-GA)
11002.7 "CO"-PHFER beacon, good CW copy at 1514. (W4JBM-GA)
11175.0 Offutt-USAF HF-GCS, sending Animosity to 11059.5 for voice and data, at 2000. (MDMonitor-MD)
11208.0 Habitat-US Navy, WA, clear and secure with 804, at 1401. (Metcalfe-KY)
11217.0 Cape Radio, no joy calling NASA 500, then asked them to try 8992 and 10780, at 1600. (W4JBM-GA)
11232.0 Canforce 4088-Canadian Forces CC-177, patch via Trenton Military to Wing Ops, at 0113. (Cleary-SC)
11348.0 5Y-KYC-Kenya Airways Boeing 737, HFDL log-on with Las Palmas, at 1802. (MPJ-UK)
11354.0 Novator-Russian Navy, Murmansk, working Priboj at 1720. (PPA-Netherlands)
13243.5 FDI 22-French Air Force, Narbonne, RTTY "brick" test loop at 0959. (PPA-Netherlands)
13368.0 LCR154-Polish Military, working SPF219, ALE at 1209. (MPJ-UK)
13908.0 E11, preamble "640/43" and message, at 1650. (Mike-UK)
13927.0 AFA5RS-USAF MARS, IN, patching C-130 Reach 8807 to Hurlburt Ops, at 2134. (Stern-FL)
14405.0 AFA9PF-USAF MARS, opening Transcon Space Support Net for shuttle launch audio, at 1730. (Cleary-SC)
17967.0 15-HFDL ground station, Al Muharraq, Bahrain, squitters at 1012. (PPA-Netherlands)
18261.0 GYA-UK Royal Navy, Northwood, FAX weather chart for Red Sea and Gulf, at 0911. (MPJ-UK)
20390.0 Cape Radio, no joy with NASA 500, back to 10780 at 1325. (W4JBM-GA)

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US Civil Air Patrol ALE Network

The Civil Air Patrol, the official auxiliary of the US Air Force, is a non-profit organization with 57,000 members nationwide. CAP performs 90% of continental US inland search and rescue missions as tasked by the Air Force Rescue Coordination Center and was credited by the Air Force Rescue Coordination Center with saving 90 lives in 2008.

Its volunteers also perform homeland security, disaster relief, and counter-drug missions at the request of federal, state and local agencies. The members play a leading role in aerospace education and serve as mentors to the more than 22,000 young people currently participating in CAP cadet programs. CAP has been carrying out its mandate for nearly 70 years.

CAP is organized into eight regions, each of which has its own headquarters:

North East	McGuire AFB, NJ
Middle East	Richmond, VA
South East	Maxwell AFB, AL
Great Lakes	Columbus, OH
Rocky Mountain	Salt Lake City, UT
North Central	Cedar Rapids, IA
South West	Wichita Falls, TX
Pacific Coast	Hayward ANGB, CA

Each state operates its own HQ and a number of squadrons, usually based at small regional airports and local Air Force or Air National Guard facilities:

AK	Elmendorf AFB
AL	Maxwell AFB
AR	Little Rock
AZ	Luke AFB
CA	Van Nuys
CO	Petersen AFB
CT	Middletown
DC	National Capital Region, Bolling AFB
DE	New Castle
FL	Homestead ARB
GA	Dobbins ARB
HI	Honolulu
IA	Carlisle
ID	Burley
IL	DuPage Airport, West Chicago
IN	Heslar Armory, Indianapolis
KS	Salina
KY	Frankfort
LA	Baton Rouge
MA	Hanscombe AFB
MD	Glen Burnie
ME	Augusta
MI	Selfridge ANGB
MN	Inver Grove Heights
MO	Whiteman AFB
MS	Jackson
MT	Great Falls
NC	Burlington
ND	Bismark
NE	Camp Ashland
NH	Concord
NJ	McGuire AFB
NM	Kirtland AFB
NV	Sparks
NY	Westchester County Airport, White Plains
OH	Columbus
OK	Tinker AFB
OR	Eugene
PA	Fort Indiantown Gap, Annville
PR	San Juan (Isla Grande Airport)
RI	T.F. Green Airport, Warwick
SC	West Columbia
SD	Rapid City
TN	Alcoa
TX	Waco
UT	Salt Lake City
VA	Chesterfield Airport, Richmond
WA	McChord AFB
WI	Madison
WV	Yaeger Airport, Charleston
WY	Cheyenne (Warren AFB)

Like many other US military and information agencies, CAP also makes extensive use of MIL-188-141A ALE in order to keep communication channels open on HF. As yet, traffic appears to be limited to link checks between the various outstations and the National HQ at Maxwell Air Force Base in Alabama.

The following frequencies offer an opportunity to hear the CAP stations from around the country.

2011, 3068, 3204, 4477, 4490, 4585, 5006, 5447, 5711, 6773, 6800, 6806, 7602, 7665, 7739, 8012, 9047, 9081.5, 10162, 11217, 11402, 12081, 12124, 13242, 13415, 14357, 14445, 15602, 17412, 19814, 20107, 23006 kHz USB

Activity levels are quite high and you should be able to hear a good selection of stations by parking your receiver and decoder on any channel for a few hours. Here is a list of identifiers heard so far with locations.

00004SCCAP	South Carolina
0002SCCAP	South Carolina
0004WICAP	Wisconsin
0004ILCAP	Illinois
0011ARCAP	Arkansas
001NHQCAP	HQ Maxwell AFB, Alabama
002NHQCAP	HQ Maxwell AFB, Alabama
0032WVCAP	West Virginia
0033COCAP	Colorado
004SWRCAP	South Western Region
004MERCAP	Middle Eastern Region
004RMRCAP	Rocky Mountain Region
0041MICAP	Michigan
0042MICAP	Michigan
0100PRCAP	Puerto Rico
0196NECAP	Nebraska
0204MICAP	Michigan
022NHQCAP	HQ Maxwell AFB, Alabama
027HICAP	Hawaii
0272HICAP	Hawaii
0314MICAP	Michigan
033NHQCAP	HQ Maxwell AFB, Alabama
037RMRCAP	Rocky Mountain Region
042RMRCAP	Rocky Mountain Region
042SERCAP	South Eastern Region
043MERCAP	Middle Eastern Region
043SERCAP	South Eastern Region
043NHQCAP	HQ Maxwell AFB, Alabama
044NCRCAP	North Central Region
046NHQCAP	HQ Maxwell AFB, Alabama
047NHQCAP	HQ Maxwell AFB, Alabama
047SERCAP	South Eastern Region
060PCRCAP	Pacific Coast Region
062NHQCAP	HQ Maxwell AFB, Alabama
064NHQCAP	HQ Maxwell AFB, Alabama
100SWRCAP	South Western Region
101NERCAP	North Eastern Region
104MERCAP	Middle Eastern Region
201SERCAP	South Eastern Region
900NHQCAP	HQ Maxwell AFB, Alabama
901NHQCAP	HQ Maxwell AFB, Alabama
951NHQCAP	HQ Maxwell AFB, Alabama
971NHQCAP	HQ Maxwell AFB, Alabama
991NHQCAP	HQ Maxwell AFB, Alabama

AVS "Avenging Spirit" National HQ Special Use
RIC National Technology Center, Richmond, Virginia

❖ Ecuador Navy using MIL-188-110A

A few weeks ago, I happened to stumble on the typical quick burst of a 110A serial tone modem. Then came the usual agonizing wait for the next burst in order to be able to tune the signal properly. Within a few minutes, I had the correct center frequency. The signal was quite weak and the decoder barely able to achieve a lock. With this kind of signal, the number of errors is usually so high as to make even plain text look like nonsense sometimes. I decided to do something else instead and hope that the conditions would improve.

A few hours later I returned to a screen which showed a lot of encrypted traffic and the odd word of plain-text. The words mentioned were CORGAL, FRAPAL and CORMAN. I'd seen them before but couldn't remember where. A quick search of my logbook, and I had the answer: Ecuador's Navy had used these identifiers when using MIL-188-141A ALE before, but I'd never seen them using this mode.

Here's a list of frequencies and modes used by Ecuador's Navy:

7667.7kHz USB	MIL-188-141A ALE and MIL-188-110A HF modem
7901.0kHZ USB	MIL-188-141A ALE and MIL-188-110A HF modem
8165.0kHz USB	MIL-188-141A ALE and MIL-188-110A HF modem
8901.5kHz CF	109bd/400Hz SITOR-B
12323.5kHz CF	109bd/400Hz SITOR-B
16416.4kHz CF	109bd/400Hz SITOR-B
18201.5kHz CF	109bd/400Hz SITOR-B
18451.5kHz CF	109bd/400Hz SITOR-B

❖ 10266kHz Mystery Net

Before we leave, here's one that needs a bit more detective work. On 10266 kHz USB, you'll find a net that uses the ALE identifiers MC1, MC2, MW1 and BN1. They don't talk to each other much – just a few times a day. Occasionally, they will send MIL-188-110A serial tone high-speed modem traffic which looks to be encrypted with a "TEQTEQTEQ" lead-in when viewed in ASCII.

This signature has previously been seen on Venezuelan Army networks, but may not be exclusive to them. Most days, I have such a strong signal from the day-long STANAG4285 transmission on 10264.1 kHz from the French Navy that copying this network is nearly impossible. Take a listen and let me know what you find at the email address at the head of the column.

That's all for this month. Enjoy the digital DX.

Fred Waterer
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www.doghousecharlie.com/radio

Toronto's SW Voice and Theater of the Mind

This month I was intending to shine the *Programming Spotlight* on Radio France International, but, as I type this, RFI is busy with a strike by employees fighting the latest round of funding cutbacks. So this month we'll look at two topics, which on their own would not fill a column, but which together I hope you will find of some interest.

One of Canada's few commercial shortwave stations is back on the air (although they have encountered the odd glitch) broadcasting from Toronto, Canada. And, we'll look at arts and drama broadcasts from around the world.

❖ Canada – CFRX

Canada's CFRX, broadcasting 24/7 on 6070 kHz with 1 kW, relays Toronto radio station CFRB 1010 kHz. As the crow flies, CFRX is about 50 to 60 miles from my home close to the US-Canada border near Niagara Falls. For a small transmitter, the CFRX signal gets out quite far. I had heard that the station was back on the air, so I sent an email to my colleague in the Ontario DX Association, Steve Canney, who has been CFRB/CFRX QSL manager for a number of years.

"All I know is that CFRX is still under 'test' mode...which means the new transmitter hasn't been 'type approved' by Industry Canada yet so it's classified as test mode. I need to check on if this has changed. When type approved, nothing will change with regard to what we hear, it's just an official thing a broadcaster has to have done on the technical side. My guess is, once this is done, we'll probably hear mention of CFRX back on with limited on-air promotions.

"The antenna and transmitter are new, both being activated last September. The antenna is a replica of the one that was damaged and the transmitter is a 'brand spanking new' solid-state unit.

"As for reports, man, after 18 years there's been a lot of long distance reports… probably around 45 countries overall, most U.S. states and all of Canada. The most recent were from Iowa, Florida, Costa Rica, Russia and Vancouver. One area of the world the signal doesn't seem to get into much is Asia. The only Asian reports are from Asian students studying in the U.S. who sent a report from their respective university but nothing ever from Asia itself.

Steve Canney with the CFRX transmitter

"With the take over by Astral Media, there have been a number of people let go recently, many of whom are big name on-air folks and a few technical people as well." (*Steve Canney VA3SC*)

CFRB is truly a Canadian heritage station, which dominated the airwaves for many years. Its inaugural broadcast was on February 8, 1927 with the announcement, "This is CFRB, the Rogers Batteryless Radio Station in Toronto, Canada." Ted Rogers, Sr., a radio pioneer, an inventor – and some would suggest, a genius – founded CFRB. A few years earlier, he had invented the first AC tube, which would allow a home radio to run on alternating current, rather than large messy batteries.

CFRB founder Ted Rogers Sr

(As an aside, he almost put my grandfather out of work. My grandfather was a "batteryman" whose job it was to replace those old messy batteries as needed. But for Henry Ford, his livelihood would have been eliminated altogether!-*fw*)

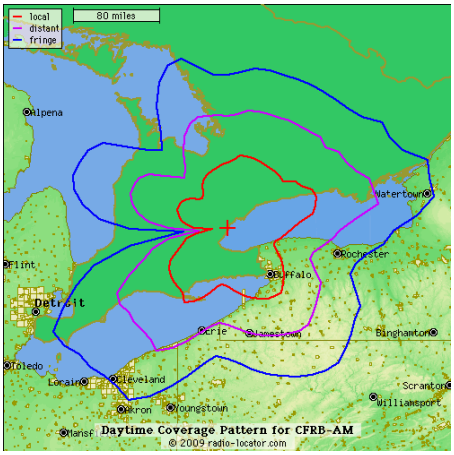
What can one hear on CFRX? As mentioned, it is a 24/7 relay of CFRB (with two CFRX Idents per hour). At one time it dominated Toronto with a mixture of hard-hitting news, commentary and "beautiful music."

CFRB was the long-time home of Gordon Sinclair, who I recall as a crusty old gentleman on TV, but who for decades was known for his daily commentaries on the station. Perhaps the most famous of these was his 1973 commentary "The Americans," which was recorded by him and others, and sold millions of copies in the US and Canada (all proceeds went to the Red Cross). You can see Gordon (and the CFRB building) at this clip as he re-reads "The Americans." Sinclair was quite a character! **www.youtube.com/watch?v=Mwv-dndrMDE**

What can one hear today?

In 2009, CFRB bills itself as Newstalk 1010. And that's basically what you get. News is heard on the hour and half hour, with lots of talk of a generally right-leaning orientation. Listening to CFRB/CFRX will give you a taste of life in Canada's biggest city.

Some highlights include **Strong Opinions** weekdays at 3pm and 11pm Eastern (1900 and 0300 UTC) hosted by Michael Coren and Tarek Fatah. Recently they added **The John Tory Show** on Sunday nights (Mon 0000 UTC). Tory is a former Commissioner of the Canadian Football League, ran Rogers Cable (part of the media empire built by Ted Jr.), and had a run as a party leader in Ontario.



CFRB coverage graphic

Also on Sunday and mentioned in a past column, is the **Dr Joe Schwarcz** program, health talk on Sundays at 3pm Eastern (1900 UTC).

Catch them while you can QSL

Perhaps now is the time to try for them. In today's climate, CFRX may not be there forever. I hope it doesn't join CFCX (Montreal) and CHNX (Halifax) in the history books, but you just never know when these tiny voices will be silenced forever.

Finally, a reminder that the Ontario DX Association are the QSL managers, so reports can be emailed to *cfrx@ymail.com*, *odxa@rogers.com*, or mailed to: Ontario DX Association, 155 Main St.N., Apt. 313, Newmarket, Ontario L3Y 8C2 Canada. There are also some comprehensive CFRX pages at the ODXA website **www.odxa.on.ca**

❖ Radio Drama

I love "theater of the mind." Whether one is listening to a factual program, a sports broadcast, a dramatic reading, or a staged play, one can travel in one's mind to the places and see the things that are being described. A really good baseball broadcaster can make you see the left fielder glide under a ball to make a spectacular catch. A war correspondent can enable you to see the events

unfold around him. And a good radio drama or adventure can make you feel like you are part of the action.

I was searching the Voice of Russia website and noted one of my favorite programs of this genre is now gone, *Audio Book Club*. It was a relatively obscure program on VoR, which is a pity, because it brought the listener some of the great works of Russian literature. (I should declare a bias here, as I was a Slavic Studies – Russian language and literature – major in University and studied many of these works.) There are other programs on the VoR where one may be able to hear the works of Tolstoy, Pushkin and Turgenev, but now it's hit or miss.

BBC

One of the great treasures of the internet age is **BBC Radio 7**. On any given day, one can hear serialized book readings, plays, sci-fi stories, crimes and thrillers and biographies. Recently one could hear ***Q & A*** in 10 daily episodes. ***Q & A*** was the story that became the basis for the blockbuster film ***Slumdog Millionaire***.

BBC 7 has an ever-changing line-up of programs with something for every taste. It has the time to broadcast lengthy dramatizations of major works, too, such as Tolstoy's ***War and Peace*** in 10 one-hour episodes. Plus, with "On Demand" listening, one can pick and choose from this audio smorgasbord. I visit almost every day. **BBC 7** also provides a weekly newsletter with listings of all the programs coming up the following week, direct to your inbox every Friday. Check it all out at **www.bbc.co.uk/radio7/**

Staying with the BBC, **Radio 4** is also a good source of "mind candy." Daily broadcasts include *Afternoon Play*, *Book of the Week* and *Book at Bedtime*. You can access these and other programs at **www.bbc.co.uk/radio4/programmes/genres/drama/current**

BBC **Radio 3** also has some drama and arts content, which you can access at **www.bbc.co.uk/radio3/speechanddrama/**

On the **World Service** a couple of programs stand out. *BBC World Drama* "gives listeners around the world an opportunity to hear entertaining, intelligent and moving drama – from the classical greats to innovative new writing – from the UK and around the world." It can be heard Saturdays at 1901 UTC or online at **www.bbc.co.uk/worldservice/arts/2009/03/000000_world_drama.shtml**

Also on offer from the BBC World Service is *World Book Club*, which I subscribe to as a podcast. Harriett Gilbert, who launched it in 2002, hosts the program. The program gives World Service listeners the chance to send in questions for authors of note from around the world (the scheduled guest in July was Gunther Grass of *The Tin Drum* fame). *World Book Club* can be heard on the first Saturday of the month. The most recent four episodes are available to hear on the website, or you can subscribe to the podcast. Check it out at **www.bbc.co.uk/worldservice/arts/2009/03/000000_worldbookclub.shtml**

Australia and New Zealand

Moving to the other side of the world, **Radio New Zealand National** on local Sunday afternoons presents four hours of *The Arts on Sunday*. "*The Arts on Sunday* is literally radio with pictures ... and theatre, film, comedy, books, dance, entertainment and music – all the things, in other words, that make life worth living." **www.radionz.co.nz/national/programmes/artsonsunday** The program may also be available on **RNZI** on Sundays at 0000 UTC.

Australia's **Radio National** is the home of *Airplay*. "*Airplay* is Radio National's weekly program of new Australian radio writing and performance. *Airplay*'s half-hour dramatic fictions experiment with form and explore a wide range of subjects, genres and styles, aiming to offer programs, which are innovative and engaging. It involves collaboration with both established and emerging writers, performers and composers." Listen online on demand or download it as a podcast at **www.abc.net.au/rn/airplay/**

Weekdays on **Radio National**, one can also hear *Book Reading*, one of the longer running programs on RN. "*The Book Reading*, presents the best of classic and contemporary fiction by Australian and world writers, read by some of Australia's finest actors. It has been broadcast on ABC Radio since 1948." **www.abc.net.au/rn/bookreading/**

Canada

CBC Radio One has been running a dramatic series for three years now, based on Canada's involvement in Afghanistan, called *Afghanada*. It is a very compelling presentation, which has had me "glued to the set" more than once.

"Four Canadian soldiers ship out to Afghanistan. They are immediately sent deep into the heart of the conflict: Kandahar Province, where the Taliban insurgency is fiercest. *Afghanada* gives us a grunts'-eye-view of the conflict. Every day, these Canadian soldiers on the ground confront the chaos and violence of life 'outside the wire.' They don't have the big picture; they're not interested in the policy. They're just trying to help the people, protect each other...and survive.

"*Afghanada's* sound is edgy and gritty, the impact immediate, pushing the listener into an auditory journey that is impossible to escape. It is a reflection of the very real situation Canadian soldiers are facing every day in Afghanistan." (CBC website)

Afghanada is not currently on the air as this is written, but I hope it returns for a summer or fall run. Barring that, all three seasons are available for purchase from the CBC. **www.cbc.ca/afghanada/**

Bill and Jenny are cast members of Afghanada

Another interesting program on Sunday afternoons on **CBC Radio One** is *Writers and Company*. Hosted by Eleanor Wachtel it is more about the writing process, and the writers themselves. "Now in its nineteenth season, *Writers & Company* offers an opportunity to explore in depth the lives, thoughts and works of remarkable writers from around the world." It is heard at various times on Sunday afternoon depending on where you listen, and across the network on Thursdays at 11pm local. **www.cbc.ca/writersandcompany/**

Finally, there is an old chestnut that has been on the air since 1950. It may not be to everyone's taste, but I refer to the broadcast of *Unshackled***.** It is a throwback to radio dramas of the forties and fifties. Each episode tells the story of some person's conversion to Christianity. I used to listen to this program all the time; just the style and "old time" feel of the program is worth a hearing. You can visit the program online at **www.unshackled.org/** You can also hear the program on **WWCR** at 1230 UTC Tuesdays on 15825 kHz and on UTC Saturdays at 2330 on 7465 kHz.

A recording session for Unshackled

NASB

National Association of Shortwave Broadcasters

Representing the privately-owned shortwave stations in the USA

- Find links to all of our members at www.shortwave.org
- Subscribe to our free Newsletter: nasbmem@rocketmail.com
- Listen to "The Voice of the NASB" on the third Saturday of each month on HCJB's DX Party Line: 12 midnight Eastern Time on 9955 kHz
- Next annual meeting May 21, 2010 in Hamilton, ON, Canada
- More info at www.shortwave.org/meeting.htm

NASB is a member of the HFCC (High Frequency Coordination Conference) and the DRM (Digital Radio Mondiale) Consortium

GLOBAL FORUM

THE WORLD OF SHORTWAVE BROADCASTING

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Save Shortwave - Run Commercials!

Making mainstream news were stories that, to help defray Vatican Radio's $30 million annual operating costs, VR would begin running spot advertising on July 6, starting with Italy's state-controlled energy provider, Enel. According to station director Fr. Federico Lombardi, an advertising agency is to vet the radio ads to make sure they are in keeping with moral standards. This came from BBC news, radio-info.com and Catholic News Agency, via Dragan Lekic, Mark Hattam, Zacharias Liangas, and Richard Lewis.

The trouble with mainstream news is that they have no particular interest in shortwave, and these stories did not explicitly say this included VR's external SW broadcasts. Bill Bergadano did, however, hear VR itself talking about it on the 0250 English broadcast; but that's still inconclusive.

Mike Cooper got more details from AFP. Commercials in five languages (Italian, English, Spanish, French and German) would be broadcast on FM radio until September 27, bringing in 100,000 to 200,000 Euros for the "papal radio," which "needs resources" to develop "new initiatives and new programs," Lombardi said. AFP noted that many local radio stations around the world rebroadcast Vatican Radio.

Kim Andrew Elliott concluded that the ads would only be on FM "105 Live'' in Roma. Nevertheless, this raised the question of whether any non-private SW stations already run advertising.

In *DX LISTENING DIGEST*, April Ferguson writes, "I've heard solicitations for ads on the English service of the Voice of Russia. It would certainly explain why there's stuff like *The Christian Message from Moscow* on the VOR.''

I am not sure that is a "sponsored'' program under present circumstances, but it sure beats Aum Shinrikyo. I seem to recall that their program grid a few years ago had some open spaces in it, presumably for infomercials or paid programming, but the present one **www.ruvr.ru/main.php?lng=eng&w=225&p=** has all the spaces filled, with lots and lots of redundant repeat repeats, so it would be hard to pick out anything which could be "commercial.''

Kai Ludwig says, "Announcements of possible advertisement arrangements had been broadcast by the German service (of what at this time was still Radio Moscow International) already some 15 years ago. No such ads heard since, but quite a lot of paid religion.''

Sergei S. in Russia: "Yep, it's an old story. VoR's Russian world service still runs an occasional announcement trying to entice businesses into ordering a commercial or two. No takers for 20 years now. Should you decide to give VoR a try though, here are the contact details: **www.ruvr.ru/main.php?lng=rus&w=417&p=** Radio ex-Free Chechnya is part of the deal!

"Back in the very end of the '90s, the gracious host of the VoA Tour told me that VoA would soon start running commercials in its broadcasts. She even named Pizza Hut as one of the future advertisers! Anyone heard those? :)

"I believe, only R. Beijing was mildly successful in selling commercials. An enterprise gets an interest-free loan from the government, but then it's required to spend a tiny part of it on buying commercials on state radio, including external service. And RFI heavily uses its website trying to make a few extra euros.''

On the swprograms list, Richard Cuff, PA: "The BBC is doing that for the **http://news.bbc.co.uk** website: has the capability to serve ads to Internet users that originate outside the UK.''

Bill Bergadano, KA2EMZ: "If anything, run tourism ads: I know a lot of people that go to the Netherlands; run a few ads about the country on shortwave. Anything to get them back on to North America.''

John Figliozzi: "I think advertising on international broadcast stations is a perfectly reasonable thing to do if the effort is properly tailored.''

Brian Alexander, *DXLD*: "On 15275, R. Thailand at 0017-0029, with English news had ads for Spa Intercontinental, Infinity Fitness Gym and a Thai export company.''

ANGUILLA I have accomplished the impossible: heard a local ID on the Caribbean Beacon, 11775! Normally it's 24/7 satellite feed from University Network HQ in LA, with no local breaks built in or ever exercised.

Chinese jamming against India in Tibetan ends at 1330, but then there was still co-channel interference on May 26 to Pastor Melissa Scott from another preacher, breaking at 1332 for a local timecheck and ID from the YL announcer at The Caribbean Beacon. The same mixture of local and network programming was heard almost every morning until June 11, when PMS was again in the clear, probably by powering down the MW until it did not get into the SW transmitter, not a permanent fix.

The MW 1610 frequency simulcasts SW most of the day, except at 1000-1600, and the clash would end each day around 1600, as Brandon Jordan noted. Really, it still happened after 1600, except the audio was the same, so one could not tell. There was usually a music break at 1500, and a variety of preachers at other times, many with Caribbean accents. Audio level of the MW programming was almost matching the SW programming. Too bad they did not simply suspend the SW programming and let us listen to the local station alone for a change (gh)

AUSTRALIA Anomalies at Radio Australia: May 30 from 1249 until 1400, at least five frequencies from Shepparton were missing: 9590, 9580, 9560, 9475 and 6020. Massive power failure, or necessary maintenance break? We never got an explanation. They were all back the next morning.

Then on June 3 at 1148 we found two separate English programs: live sports on 9580 // 9560, and regular talk programming on 9590 // 9475. But they continued separate after sports instead of rejoining; the first pair at 1215 with *Nightlife* from the ABC Local Radio network, the second pair with LNL – *Late Night Live*, from National Radio, the usual show heard on all frequencies. It was not exactly a mistake, since *Nightlife* greeted listeners via RA.

Even stranger, at 1300 past 1400, 9590 was in Chinese instead of English, along with 9475 which is supposed to be in Chinese. But the next morning before 1300 it was back to a single English program on all these frequencies, including *Asia-Pacific* with a report from China on the 20th anniversary of the Beijing massacre, about which CRI itself kept mum (gh, OK)

The change in RA's programming on 3 June around 1100 was probably due to one of those ball games played by overpaid entertainers. It was the night of Rugby League's first State-of-Origin game between Queensland and New South Wales, played in Melbourne, Victoria. As League is hugely popular in parts of the Pacific, especially PNG, they probably grabbed a couple of appropriate frequencies to carry it (Ian Johnson, ARDXC, *DXLD*)

BANGLADESH Re last month: DST of UT+7 replacing UT+6 was to start June 19 for an unknown period. Local stations would sign on and off a UT hour earlier, at 2300 and 1610 (Supratik Sanatani, West Bengal, *DXLD*) The state minister for power said the new timing may continue until the end of September (bdnews24.com via Alokesh Gupta, *ibid.*)

This is a permanent change, not a summer/winter exercise (Chris Greenway, *ibid.*) ''The new BST will virtually be permanent standard time for Bangladesh if the time change does not make any major negative impact,'' prime minister's adviser Tawfiq-e-Elahi Chowdhury told *New Age* (via Greenway)

BOLIVIA Red Panamericana heard with a good enough signal on 5870 at 1040 UT, unlisted frequency (Victor Castaño, Uruguay, *condiglist* yg) La Paz station nominally on 6105; no other reports (gh)

6075, Radio Kawsachun Coca, Lauka, heard again in late May, early June: political matters in Spanish at 2325-2337, strong QRM presumed by Deutsche Welle. Much better from 1001 with national anthem, ID, 1010 folk, Andean music, 1015 ID (Lúcio Otávio Bobrowiec, Brasil, *DXLD*) 0950 carrier on, heard most days

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; sesqui = one and a half; A-09=spring/summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

1020-1055 (Bob Wilkner, FL, *ibid.*)

Pres. Evo Morales issued a decree that the official name is no longer República de Bolivia but Estado Plurinacional de Bolivia, according to local press reports (Prensa Latina, Cuba, via Rogildo Fontenelle Aragão, Bolivia, *HCDX*)

BRAZIL 4885, R. Difusora Acreana, Rio Branco, Acre, reactivated with religion and relay *Voz do Brasil* at 2245 (Rogildo Fontenelle Aragão, Bolivia, *HCDX*) The Brazilian we usually hear all night on 4885 is R. Clube do Pará, but listed with only 2 kW vs 5 for Acreana (gh)

Distorted music centered on 6500, May 31 at 0630: No stable carrier, and strong blubbering signal, maybe partly utility QRM mixed in. 0638 started talking and with some strain, I finally determined it was in Brazilian. R. Nacional da Amazônia, sure 'nuff, missing from 6185 leaving XEPPM in the clear, not usually the case on UT Sundays when RNA runs all-night. And 6500 // 11780, clinching it. So the 6185 transmitter was *very* out-of-order; no one paying attention in Rodeador Park? When are they going to get the new ones installed? A fortnight later, back on 6185 (gh)

CBN Goiânia on 12460 kHz in FM clear ID at 2053-2100*. Quite sure mode was FM as I tried all the others on my IC 706 MKIIIG, and could only hear it in FM (Antônio Garcia, Paraíba, *dxclubepr* yg) Nominally on 11830 in AM, a spur? (Renato Uliana, *ibid.*) Nothing heard on 11830, but on my R5000 have also heard CBN on 12460 FM for several days (Gabmar Cavalcanti Albuquerque, Paraíba, *ibid.*) I also heard it with sports at 1450 on 12460, but did not think it was FM (Anderson Jose Torquato, Santa Catarina, *ibid.*) Definitely in narrow-band FM (Uliana, *ibid.*)

Rádio Cultura Brasil, São Paulo (SP), will shortly reactivate on 17815 once transmitters are relocated to new site; 10 kW (Moreno, at the station via George Cunha, via Célio Romais blog May 11) No sign of it by June 13; made a nice DX catch years ago (gh)

CANADA Every so often, R. Canada Internal is caught broadcasting in a language contrary to its own schedule: such as June 3 at 1435-1500+ on 9515 in Portuguese (Brazilian) with French lessons, rather than in Russian. Why? (gh, OK)

Weak third harmonic from CHU 3330 at 1215 on 9990, just below WWV; very weak but could detect familiar CHU time code; nothing on 6660 (Bill Mead, PA, *DXLD*) Another date at 2232, CHU audible on 6660-USB (Harold Frodge, MI, *ibid.*)

CHINA A visit to China Radio International, on invitation of the German service: Entrance to the building is severely guarded, resulting in some turbulence due to linguistic problems. First I had to announce my arrival in a small building across the street. After about five minutes I was greeted with smiles by Lu Shan from the German service. I finally got a badge.

Most impressive was an exhibition with 45 glass cabinets, corresponding to the 45 language services, each one two meters tall and a half meter wide. They contain souvenirs sent or brought in by listeners. In the German cabinet is a Bavarian beer can. The Russian cabinet contains an empty vodka bottle and *matryoshka* puppets (Paul Gager, Austria, via Kai Ludwig, Germany, *DXLD*)

COLOMBIA The pirate, Radio Juventud, heard with ballads from the 70s and 80s, on 5587.1, from 0030 until 0230, mentioning FM 104.7 and SW 5590, e-mail *radiojuventud2009@hotmail.com* (Rafael Rodríguez R., Colombia, *playdx* yg)

CUBA [and non] Although RHC 'went away' from 12000 as we reported at last month's deadline, it came back after a few days, despite the co-channel clash from Russia's blobby transmitter in Chinese until 1400. See *RUSSIA*.

Manolo de la Rosa has been honored as a radio-TV ''artist of merit'' at a ceremony in the Hall of Mirrors of the Museum of the Revolution (*Haciendoradio* blog via Juan Carlos Roque via Horacio Nigro, *noticiasdx* yg) Congrats to Manolo, best known as host of RHC's Spanish DX program *En Contacto*, Sundays (gh) Of all the RHC staff, I had the utmost respect for Manolo De La Rosa. He and his wife treated me like their son when I was there (Keith Perron, Taiwan, ex-RHC, *DXLD*) See also SPAIN

ECUADOR HCJB laments that from April 2010 there will be no more SW from Ecuador, including the Brazilian service, as all the transmitters will be officially turned off due to the Quito airport construction (HCJB Global via Ramón Aragão via Célio Romais, *Panorama, @tividade DX*) If they really wanted to maintain the service, there are plenty of other transmitters they could buy time on – such as Bonaire, Chile, Guiana French, not to mention inside Brazil (gh)

Charlie Jacobson discussed the status of HCJB's operations in Ecuador. Due to the construction of a new airport and financial considerations, HCJB's shortwave ministry has been downsizing. By April 1, 2010, all transmitters at the Pifo site will be shut down. But 49 meter broadcasts to reach the Andean area and headwaters of the Amazon will be maintained, from the high-power AM site (Charlie Jacobson, via David Creel, *NASB Newsletter*)

One day only, June 6, HCJB Spanish was on 11625 in the morning, 1350-1500*, unannounced, with domestic service from 690 // 6050 kHz so not // regular Spanish on 11690, 11960. A mistake? 11625 normally operates only at 0000-0200 (gh)

ETHIOPIA Amhara Regional State Radio, Bahirdar, 6090, e-mail reply from manager Dereje Moges, *dereradio2000@yahoo.com* says it was established 12 years ago, now runs 9 hours a day. Since May 9 it has 100 kW on MW 801 kHz and SW 6090 (Björn Fransson, Sweden, *SW Bulletin*)

Also got friendly e-mail verification from him in less than 24 hours, heard during an Anguilla silent period (Brandon Jordan, TN, *DXLD*)

6170, Voice of Tigray Revolution, 0254 flute IS, 0259 vernacular opening, presumably back here replacing 5980; in the clear but slightly weaker than // 5950 (Martien Groot, Netherlands, *WORLD OF RADIO*)

FRANCE The strike at RFI which began May 12 kept being prolonged by union member votes day after day, week after week for more than a month, as management refused to negotiate (via Mike Cooper, *DXLD*)

Not an all-out stoppage of all staff, but broadcasts disrupted in most languages, thanks to tactical striking by technical staff or journalists (RFI website via Mike Cooper) A director, Geneviève Goetzinger, defends the plan to eliminate 206 positions as "non-negotiable." (*Le Monde* via Cooper)

GUIANA FRENCH transmissions mostly continued on the air with *RFI Musique*, a quite enjoyable substitute of musical variety, e.g. during what had been Spanish broadcasts at 2100-2130 on 17630, 1200-1230 on 13640 (gh)

HAWAII AFRTS Pearl: I have not heard 6350 on the air for over two months. 10320-USB is on around the clock (Brock Whaley, Oahu, *DXLD*)

INDONESIA Only 60m RRI I could hear in early June was 4750 if listening early enough at 1132 shortly after sunrise. Any others active? (gh, OK)

Yes, these also heard around 1100: 4869.925, drifting to as high as 4869.940 kHz: RRI Wamena (site presumed). Could possibly be Sorong drifting low. And 4925.009, RRI Jambi.

So, including Makassar, only three Indos on 60. Fak Fak [4790v] had been off for about two weeks.

A few Indos on 90/75 meters, 1100+ UT:
3325.000, RRI Palangkaraya (presumed site) under PNG
3344.962, RRI Ternate, fair under PNG
3976.048, RRI Pontianak
3995.071, RRI Kendari (David Sharp, NSW Australia, *DXLD*)

Great frequency planning, PNG and Indonesia both on some tropical channels. It may have been ''necessary" when RRIs were all over, but not any more (gh)

IRAN [non?] On 3920-3934v, a clandestine signs on around 0145, and on 4770-4795v, ex-4880 around 0158, different programming, sounds like *Radyosu Turkestani Irana*, formerly V. of Kurdistan? Jammed from 0210 (Rumen Pankov, Bulgaria, BDXC-UK *Communication* and *Australian DX News*)

ISRAEL Minister of Information and Diaspora Yuli Edelstein has secured funding for the continued operation of Israel Radio's Persian Service, a budget of NIS 3 million for the next two years. Funds will come from the Information and Diaspora Ministry (Yaako Katz, *Jerusalem Post* May 19 via Dale Park, *DXLD*)

Israeli media are reporting that a small and unconventional Iran office in the Ministry of Defense will be shut down. It funded a Farsi-language Israel Radio program broadcast on shortwave into Iran (Laura Rozen, *Foreign Policy*, 25 May 2009 via kimandrewelliott.com) Persian is the only service remaining on SW. Nothing is clear in Israel (gh)

KASHMIR Radio Kashmir, Srinagar now signing on at 0000 on 4950, instead of 0025 in summer, 0120 winter (Jose Jacob, *dx_india* yg)

KOREA NORTH KCBS is being reported 24/7 on 14250 = 5 x 2850. Another harmonic inside the 20m hamband is VOK on 14280 = 2 x 7140 (VR-2BrettGraham, Hong Kong, *DXLD*) 2850, which we can hear in winter, may be only 22/7, as per Aoki at 20-18 UT (gh, OK) 3 x 7140 also heard on 21420, bad maintenance (S. Hasegawa, Japan, NDXC)

[and non] Are the N. Korean jamming facilities being stretched thin? Echo of Hope on 6003 was free from the usual jamming (rapid pulsating noise). It is rare to hear them in the clear. This also helped reception of CNR-11 (Tibetan Service) on 6010, which usually has some QRM from adjacent jamming. Instead heard the same non-stop rapid pulsating noise on 5910, from 1354 past 1501, to jam Shiokaze (*1400-1430*), which was in Japanese. Next day just the opposite, with Shiokaze (in English) completely in the clear and Echo of Hope (VOH) on 6003 being jammed again, as it usually is. So North Korea did not have enough jammers to cover both stations on the same day? (Ron Howard, CA, *DXLD*)

KOREA SOUTH I have a personal blog with pictures and stories of my trip to Korea last March. It's been a dream of mine to visit Seoul and KBS. Finally got the opportunity to meet the staff and toured the facilities (Kevin O'Donovan, NM, **http://jazzkevin.blogspot.com** *DXLD*)

MADAGASCAR Events surrounding Madagascar World Voice (the SW project of World Christian Broadcasting) were discussed by Charles Caudill. In a rather violent coup d'état, rioting escalated and the WCB warehouse was attacked at random and destroyed in January, loss estimated between $50,000 and $100,000. Other equipment was hidden, and American staff evacuated; army protected the site, and great progress is being made though delayed by theft of wire. WCB is trying to keep a low profile and keep doing its business (David Creel, *NASB Newsletter*)

MALI 5995, RTV du Mali, 0635-0700. Knock-your-socks-off signal, great selection of tribal tunes with YL DJ in French. Plenty of drums and wind instruments, most of which sounded rustic as if it was recorded remotely, on site. Others were professionally-produced studio recordings, not diminishing entertainment value. All music in vernaculars, not French. Frequent "Radio Mali" IDs. Another day at 0650-0710, strong enough to rattle the windows, fabulous tribal music – vocals with lots of different wind and percussion instruments. 0700 formal ID in French and news (Bruce Barker, PA, *DXLD*)

MÉXICO The engineer at RASA Yucatán, Orlando Balam, asked me June 3 if I was hearing XEQM on 6105. I tried again and did hear it well at 0030 with commercials, all in Spanish (Julián Santiago Díez de Bonilla, DF, *DXLD*) Heard only a carrier in mid-May on 6104.77 (Bob Wilkner, FL, *ibid.*) All negative on daily checks May 27-June 2, but 6104.73 heard the same night as JSDB at 0233 with phone calls, ads, songs, until blocked by RL at 0258 (Martien

Groot, Netherlands, *ibid.*) Also next morning at 1108-1210, Mexican ballads, Spanish talk on 6104.50, XEQM, presumed, still in at 1217 when on 6104.69 (Chuck Bolland, FL, *ibid.*) Subsequently 6104.49 at 1040 to 1300 in FL (Bob Wilkner, *ibid.*) And another evening at 0030-0130 with sports news (Julián Santiago Díez de Bonilla, *ibid.*)

MONACO [non] News from Radio Monaco, FM 95.4 is relayed live M-F at 0700; and the 0800 news is delayed for relay until 1100, via coastal station Monaco Radio, all transmitters in France (Christian Ghibaudo, Nice, *WORLD OF RADIO*) Heard at *0654-0703* on 8728-USB // 13146-USB (Anker Petersen, Denmark, *ibid.*)

NETHERLANDS [non] Protests by listeners in deep S.Am. following the cancellation of Spanish on SW to there led RN to resume one hour as of June 1, at 2300 via French Guiana on 9495, but the first date instead relayed V. of Russia in Portuguese by mistake, which they are already running on 11605. Next night, OK, but poor here in CNAm.

This led us to suggest that RN might also be persuaded to resume just one hour of English to NAm. But RN made it clear people would have to explain how it would be cost effective, as RN is convinced they only had a few hundred SWLs in NAm left when they canceled the service last year. Among persuasive letters in Spanish, we saw one from Adrián Korol in Argentina calling the previous closing in that language ''stupid."

Meanwhile, a little-known fact is that RN in English is on the WRMI 9955 schedule M-F at 22-23 UT on 9955 – part of the WRN relay block at 16-24, but it's only filler and seldom if ever really on the air.

Also meanwhile, RNW redesigned its website **www.rnw.nl** and you'd never know it is a SW station, no link on the homepage to a frequency schedule (gh)

NIGERIA A German ham, Bodo Fritsche, DL3OCH has been working on installing new curtain arrays for Voice of Nigeria at Abuja, until July, and meanwhile was using the antennas for ham contacts. See **www.qrz.com/detail/5N0OCH** (Andrea Borgnino, Italy, IW0HK - HB9EMK, *shortwavesites* yg)

OMAN 15355.000, Sultanate of Oman Radio, at 0330, weak but readable, lively male DJ, music by Pink, Duffy and The Police. Improving nicely by 0345. Audio cut at 0357 and carrier off. No news, as noted with 15140 logs at 1430 (David Sharp, NSW, *WORLD OF RADIO*)

This 03-04 English broadcast was on their schedule long ago, but had not been confirmed on air for years. Like the 1400 on 15140, we can only wonder if it is on the air extremely rarely (gh)

PERÚ 12040, Radio Victoria, at 0053, poor to fair on 2 x 6020, where blocked by China and Spain, but // good 9720 (Yimber Gaviría, Colombia, *WORLD OF RADIO*) Spanish on 12040 is not necessarily this; Perú is really off-frequency, 6019.34v as measured by Giampiero Bernardini, Italy, so an harmonic of that would really have been on 12038.68v. REE Costa Rica relay also on 6020 at 00-04 conceivably could produce its own harmonic (gh)

PORTUGAL RDPI's "sportuguese" is hard to understand here in Brazil due to strong accent and words with different meanings. Football championship coverage on 15295 hard to follow as they jumped from one game to another, a fruit salad (Célio Romais, *Panorama, @tividade DX*)

RUSSIA [and non] From mid-May at least until mid-June, and perhaps for the rest of A-09, R. Habana Cuba in Spanish, and V. of Russia via Khabarovsk aimed the opposite direction in Chinese, have been colliding on 12000 between 1100 and 1400. Despite the huge advantage in distance to OK, RHC is often even with or underneath the Russian signal between 1300 and 1400. At times, VOR is also out of order with distorted modulation, unstable carrier, noise bursts. Quite possibly, VOR does not realize RHC is there, as it refuses to participate in HFCC (gh)

VOR Moscow-area ''Serpukhov'' outlet, 12040 scheduled at 1500-2300 heard at 1820 on spur 12100-12112 kHz, very distorted audio like final stage tube failure (Wolfgang Bueschel, Germany, *DXLD*)

SOMALIA I got a QSL card from the Radio Hargeisa's Germany address. They marked out by hand all frequencies, except changed 7122 to 7145. On the next line "10 kW" is changed by hand to "100 kW T-antenna"! (Björn Fransson, Sweden, *HCDX*)

SPAIN [and non] REE was reported to have resumed QSLing, but José Moacir Portera de Melo in Mato Grosso contradicts that. He has sent several reports over the past year and never got a reply. He adds that the mailbag program ignores his letters too, only paying attention to listeners in Cuba (Célio Romais, *Panorama, @tividade DX*)

Can this be? I listened to *Correo del Oyente* at 0530 UT Saturday on 6055, 9630, 11890, and he's right. Every single call to a listener heard during that semihour was to someone in Cuba! And they all wanted pen-pals to their postal addresses; I wonder why? I expect REE feels obligated to help out their poor listeners in this benighted country otherwise cut off from contact with the real world; but they should not ignore e- or p-mail response from all their other listeners. And it was the same on weeks to come. One young lady described her skin and eye colors, politically incorrect?

Perhaps a special separate *Contacto Con Dentro-Cubanos* show should be instituted. But doing something that overt might open REE to jamming. Even though Cuba maintains relatively good relations with mother-country Spain, lots of investment, tourism, etc., there are limits.

RHC itself has a pen-pal show for DentroCubans, Sundays after 1300 on 13780 and all the morning frequencies, *Amigos de Cuba* (gh)

SYRIA R. Damascus, English at 2115-2157 with news, vocal Arabic music, commentary about US aggression, closing with choral anthem. S-10 signal with 2% modulation on 12085, but more audio than on 9330 (Dave Valko, PA, *HCDX*) Similar programming another day at 2113-2200 on 12085, better modulation than usual, fair with hum. Very poor on 9330 with very low modulation (Brian Alexander, PA, *DXLD*)

Back home in Belgium after a fabulous 4-week visit to this beautiful and friendly country. My very dear friends of Radio Damascus organized a whole program for me, reflecting the legendary Syrian hospitality. Head of the English section, Mr. Rasheed Haidar, organized several meetings for me with the director of the external services, the chief engineer of Radio Damascus' shortwave station in Adra and the other staff of Radio Damascus. Here are some answers to questions which will interest you all:

Many listeners, all over the world, are writing us about modulation problems. The Adra shortwave station is aging. Four French-made 500 kW transmitters were installed at the beginning of the 1980s and two are operational, now running 400 kW each. Very expensive RF carrier tubes for both were replaced at the beginning of 2009; not yet modulation tubes. We are also working on the buzz or hum.

We are planning to install a new shortwave transmitter next year, probably 250 kW. We will soon invite manufacturers to submit tenders. After installation and evaluating results, we might add another.

The transmitter on 9330 is specifically targeting Europe. 12085 is beamed to the USA, Japan and Australia (via Kris Janssen, Radio Damascus Listeners Club, Belgium, *DXLD*)

TAIWAN Voice of Kuanghua, via Kuanging, 9745 sent three QSL cards in the form of a jigsaw puzzle which when put together formed a map of Taiwan, received in 218 days (Chris Stacey, East Sussex, June BDXC-UK *Communication*) Only three pieces would not be very challenging; were the three actually chopped up into many smaller pieces? I think I see a new Wavescan contest (gh)

[non] RTI adds two frequencies June 15 for English to North America: 0200-0300 on 9680 to Midwest and 0500-0600 on 5950 to West Coast (RTI website via Salahuddin Dolar, Bangladesh, and via Alokesh Gupta, India, *DXLD*) WYFR relays which were canceled last year, but 0500 is a new time (gh)

On RTI's *On the Line*, Carlson Wong mentioned that Taiwanese Government representatives are now questioning RTI's future existence. We all know what that means, don't we!! <sigh> (Ian Baxter, Australia, *DXLD*)

U S A Michael L. Ketter, 48, of Pittsburgh, died May 17. He was a much-loved program director and on-air radio personality with WBCQ. See **www.pittsburghlive.com/x/pittsburghtrib/obituaries/?mode=view&obit_id=172341** (from Kracker, *Free Radio Weekly*) and **www.post-gazette.com/pg/09144/972417-122.stm** (via Larry Will, *DXLD*)

On several dates in May and June around 1330-1400+, when sporadic E 'short skip' caused WWCR to boom in on 13845, 15825, the second harmonic of nearby WWRB, 9385 could also be heard with Brother Stair up to S4 on 18770. On one occasion, 2 x WWCR 9980 on 19960 could also be detected with Pastor Pete Peters. Also look for WWRB on x 3 = 28155 and x 4 = 37540 (gh, OK)

[non] Deewa Radio, VOA's Pashto service to the war-torn Pakistan-Afghanistan border region, is expanding to nine hours daily starting June 6. The newest block of programs will focus on news and current affairs, including regional and international news, reports from a network of more than 20 local free-lance journalists, segments on Muslims in America and on youth, a world press round-up and interviews with significant personalities. The second hour will be a topical call-in show featuring a wide variety of issues affecting those in the targeted region. The final hour will be a repeat of the previous day's morning call-in show, until July 4, when it will become a live news and current affairs program. Deewa Radio is distributed on shortwave, FM, and by the Internet at **www.VOANews.com/Deewa** (VOA press release)

Above release, as usual, without the necessary details of times and frequencies so anyone could actually *hear* the subject of the item (gh) In addition to 12-18 UT, the new ones are, with sites – Kuwait, Sri Lanka, Thailand – and azimuths:

0000-0230 12015 KWT 078
0000-0100 11535 KWT 078
0000-0230 9380 IRA 334
0100-0200 11535 IRA 332
0200-0300 11535 UDO 300
0230-0300 12015 UDO 297
0230-0300 9380 IRA 332
(via Dragan Lekic, Serbia, *DXLD*)

VENEZUELA [non] No QSLs received direct from RNV, but instead from a former staffer, a full data official QSL card in color, and a letter in English saying he has retired and answers reports when he has time. $2 r.p. was sent: César Alí Méndez Martínez, P. O. Box 66267, Caracas 1061, (Rep. Bolivariana de) Venezuela (Wolfgang Gargitter, Austria, *A-DX* via *BC-DX*)

ZANZIBAR R. Tanzania Zanzibar is no longer relaying English news from Spice FM, but now from their own studio, "Voice of Tanzania, Zanzibar" as announced. At 1800-1810, I observed the English news on Monday, Tuesday, Wednesday, Friday and Sunday, not on Thursday and Saturday (Erich, *BC-DX*)

Until the Next, Best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com
http://mt-shortwave.blogspot.com

0000 UTC on 15275
THAILAND: Radio Thailand. Sign-on at 0000 into *News Hour* program and local time checks. Thai service commencing 0102, 0200-0230 program repeat of earlier programming in English and Thai at 0230 (Ron Howard, Asilomar Beach, CA). 15275, 0003-0025. English news and ads for "Spa International-Infinity Fitness Gym." (Brian Alexander, Mechanicsburg, PA). Moderate signal for Thai service 15275, 0305 (Jim Evans, Germantown, TN).
Streaming audio www.hsk9.com

0015 UTC on 6155.22
BOLIVIA: Radio Fides. Music noted as signal faded in. Brief Spanish announcement at 0020, returning quickly to music. Possible station promos from two program hosts. Excessive interference on frequency, while signal was poor. Station heard 0150-0205+ and 2310-2355 on subsequent checks (Chuck Bolland, Clewiston, FL). Additional Bolivian stations in Spanish: **Radio Yura** 4717, 0030-0045 (Lúcio Otávio Bobrowiec, Brasil/Cumbre DX), 4716.7, 2240 (Claes Olsson, Norrköping, Sweden/Cumbre DX) **Radio Eco** 4409.79 (presumed), 0140 (Scott Barbour, Intervale, NH). **Radio Fides** 6155.26, 0150-0205+ (Alexander) **Radio Libez** (presumed) 4796.28, 1053-1105; **Radio Mosoj Chaski** 3310, 1015-1030 (Bolland). **Radio Pio XII** 5952.5, 2315 (Olsson). **Radio Virgen de Remedios** 4835, 2351 (Bobrowiec).

0038 UTC on 6195.79
PERU: Radio Cusco. Poor signal for announcers' program comments, possibly a sporting event (Bolland). Additional Peruvians in Spanish: **Radio Victoria** 6019.30, 0845-0859, 1035-1045; **Radio Sicauni** 4826.50, 0143-0201*, 0920-1005; **Radio Marano** 4835.41, 1002-1010; **Radio Huanta Dos Mil** 4746.90, 1040-1055; **Radio Tarma** 4774.85, 1050-1100; **Radio Libertad** 5039.11, 1103-1115 (Bolland). **Radio Vision** 4790, 0445 (Bruce Barker, Broomall, PA).

0302 UTC on 4780
DJIBOUTI: Radio Djibouti. Station's sign-on with national anthem, followed by local flutes and musical vocals. Qu'ran recitations to Arabic comments and rustric vocals. Fair signal level but poor overall reception due to CODAR interference (Alexander).
On-demand audio www.rtd.dj

0303 UTC on 15180
NORTH KOREA: Voice of Korea (presumed). French service from male/female duo. Moderate signal despite fading. Normally only noise observed at this time on frequency (Evans). Clandestine-Voice of the People from Kyonggi-do 6600, 0913. Male/female talks to recorded speeches. Presumed anthem at 0923, degrading signal. SINPO 25232 (Jorge Frietas, Brasil/Cumbre DX).

0314 UTC on 15450
SRI LANKA: Deutsche Welle Trincomalee relay. Russian segments and a few bars of music at 0318. Signal poor with fading (Evans).
Streaming/on-demand and podcast www.dw-world.de **SLBC** 11905, 0115-0135. Hindi musical vocals to listed Hindi service. Subcontinent music weak. Threshold signal on // 7190 (Alexander).
Streaming audio www.slbc.lk

0332 UTC on 15170
SAUDI ARABIA: BSKSA. Arabic. Qu'ran recitations. Recheck at 0350 found announcers' chat. Initially a good signal with significant fading. Signal had degraded by 0350 (Evans).
Streaming audio www.saudiradio.net

0415 UTC on 9575
MOROCCO: Radio Mediterrainee/Medi Un. Qu'ran recitations noted at tune-in to Arabic music at 0425. Usual 0430 ID not observed as recitations resumed to 0435 tune-out. Audible 0735-0801 in French/Arabic (Barker).
Streaming/om-demand audio www.medi1.com

0455 UTC on 15380
CHINA: CNR-1 via Lingshi. Chinese text and conversation between brief musical melody bars. Time signal pips at 0500, good signal and heavy fading. Parallel 15480 (Bejing) observed with slightly weaker signal (Evans). CNR-1 (presumed) 12045, 0050-0101 (Mandarin). Music, sound bites and anthem (Barbour).

0520 UTC on 7250
IRAN: VOIRI. Programming listed as *Voice of Palestine*. At tune-in noted a pleasantly-voiced Muezzin recitation passage from the Qu'ran. Segment continued to 0530 as brief Arabic talk mentioning "Palestine" twice. Recitations repeated from the congregation. Passport list program from 0345-0415 (Barker).
Streaming audio www.irib.ir/worldservice.

0555 UTC on 5995
MALI: RTVM. Sign-on with guitar interval signal and national anthrm at 0558. Flute melody at 0559, followed by French station ID. Local guitar music and rustic tribal vocals at 0601. "Radio Mali" identification during poor-fair signal with adjacent channel splatter. RTVM 9635, 0801-0820 opening with French ID and local African music. Vernacular text at 0803. Lost in noise by 0823, listed // 7285 not heard due to excessive DRM signal on frequency. Subsequent monitoring 5995, 2350-0001." (Alexander). French on 5995, 0705-0730. Poor-fair signal (Barker).
Streaming audio from Chaine 2, not on shortwave www.ortm.ml

0830 UTC on 6010
COLOMBIA: Radio Conciencia/LV de tu Conciencia. Duo hosts group bible scripture discussion to 0845. Non-stop religious music to 0900. Several station identifications as "Radio Conciencia" heard throughout thirty minute monitoring session, usually heard as "La Voz de tu Conciencia." No sign of México's Radio Mil or Brazil's Rádio Inconfidencia – two stations that usually mix with Colombian (Barker). Colombia's **Radio Vida Nueva** 3980, 0630-0720. Religious music ballads, and clear Spanish ID at 0708. Also heard 0250-0315+ (Alexander).

0930 UTC on 6060
ARGENTINA: Radio Argentina al Exterior/RAE. Presumed as RAE for Spanish programming with occasional fill-in announcers. Signal poor-fair as signal fading intermittently (Bolland). RAE 11710.69, 0200-0215+, 15345, 1955-2100 (Alexander), 11710v, 0210-0310 (Howard). Argentina's **Radio Baluarte** 6214.47, 1035-1043. Spanish/Portuguese mix for religious program. SINPO 24432 (Arnaldo Slaen, Buenos Aires, Argentina).

1010 UTC on 4815
ECUADOR: Radio Buen Pastor. Local music at tune-in to to brief canned station ID break. Additional music, canned ID and promotional with echo-effects most of the time. Good signal for broadcast. Station audible this frequency 1045-1100. Music to "Radio Buen Pastor" at 1100, followed by ad string (Bolland).

1222 UTC on 4412.61v
LAOS: Lao National Radio. Site as Sam Neua per EiBi. Talk in vernacular, // 6130 to 1233 national anthem (Pheng Xat Lao) and 1233.* Both frequencies about equal strength (Howard).

1427 UTC on 15140
OMAN: Radio Sultanate of Oman. Presumed station at pop music tune-in. Usual theme music and English news at 1431. Also heard station's usual theme music at various times during the news broadcast. Signal too weak to hear a real ID. Threshold very weak (Alexander).

1430 UTC on 7350
TIBET: CNR-II. Tibetan service begins with "CNR" and "Holy Tibet" identifications. Items noted on economic developments in Tibet and three Nepali Sherpa brothers plan to stay atop Mt. Qomolangma and set a world record. Segment *Tourism in Tibet* to Tibetan music and songs. Audible on // 6010, both poor-fair (Howard).

2113 UTC on 12085
SYRIA: Radio Damascus. English news at tune-in to local pop music. Chat on North Korea, news, feature segments and ID. News headlines at 2157, closing with national anthem at 2159 and beginning Spanish service. Fair signal quality despite audio hum. Very poor on // 9330 (Alexander).

Additional loggings excluded for space constraints are posted as **Blog Logs** on the **Shortwave Central Blog** at the above web address.

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com

August QSL Closeout

With the long-awaited autumn DX season approaching, it's time to clear the files and reshuffle my in-basket of what our readers have verified recently. Whether you're still waiting on a favorite or working on your new Hit List, now is the time to get your listening post in order for an approaching DX season.

AMATEUR RADIO

Martinique-FM5CD, IOTA NA-107 14 MHz RTTY. Full data color Martinique beach scenery card. Received in 35 days from Jean Brunner-QSL Manager, 9 Rue Des Pigeonniers, Montgame 86210-Vouneuil Sur Vienne, France. Operator-Michel Brunelle, P.O. Box 321, 97287 Lamentin, Martinique (Van Horn).

Sierra Leone-Sherbro Island, 9L1X, 20 meters SSB/20 meters RTTY. Full data color scenery folder card. Received in 60 days for $2.00US to Silvano Borsa-QSL Manager, Viale Capettini 1, 27036 Mortara Pv., Italy. Email *i2ysb@12ysb.com* (Van Horn)

St. Barthelemy Island, IOTA-NA 146, 20 meters SSB. Full data color photo of Dxpedition operators. Received in 42 days via Joe Pater-QSL Manager, 2419 Pierson Road, Oxford, OH 45056-9352 USA (Van Horn).

AUSTRIA

Adventist World Radio via Moosbrunn relay, 5970 kHz. Full data color scenery card signed by Adrian Peterson-DX Editor, plus station sticker and pocket calendar. Received in 64 days for an English report and one IRC. QSL address: P.O. Box 29235, Indianapolis, IN 46229 USA (Duane Hadley, Bristol, TN).

Streaming/on-demand audio www.awr.org

CLANDESTINE

Nippon no Kaze (Korean BCB) 9965 kHz via T8WH Palau. Email response stating QSL cards are not issued. Did not indicate transmitter site as requested. Received in four days for email and mp3 audio clip to *info@rachi.go.jp* (Edward Kusalik, Canada). 9965 kHz via T8WH, Medorn, Palau. Full data, including transmitter site via email letter. Received in 13 days for email report. Letter suggest I watch the "movie Megumi in English, a documentary on Japanese abductions." QSL address: Policy Planning Division, Headquarters for the Abduction Issue, Cabinet Secretariat, Gov. of Japan, 1-6-1 Nagata-cho, Chiyoda-ku, Tokyo, Japan (Wendal Craighead, Prairie Village, KS).

ETHIOPIA

Amhara State Radio, Bahir Dar, 6090 kHz. Friendly email in less than 24 hours, with verification statement from Dereje Moges-Station Director at *dereradio2000@ahoo.com*. No response to my query on original report to: Bahir Dar, Amhara Province, Ethiopia (Brandon Jordan, Memphis, TN/HCDX).

GERMANY

Pan American Broadcasting via Wertachtal, 9515 kHz. Full data Media Broadcast antenna QSL card via email from Michael Puetz. Received in 22 days for email to: *michael.puetz@media-broadcast.com* Website: www.radiopanam.com/ US contact address: 7011 Koll Center Pkwy., Suite 250, Pleasonton, CA 94566-3253 USA (Hadley).

JAPAN

Radio Nikkei, 3925 kHz. Full data card unsigned. Received in two weeks for an English report and two IRCs. Station address: Nikkei Radio Broadcasting Corporation, 9-15 Akasaka 1-chome, Minato-ku, Tokyo 107-8373 Japan (Bill Wilkins, Springfield, MO)

Streaming/on-demand audio www.radionikkei.jp

MEDIUM WAVE

JOER 1350 AM. Received second RCC QSL card unsigned plus program schedule. Received in 545 days for an AM report and $2.00US. Station address: RCC Broadcasting Co., Ltd., 21-3 Motomachi, Naka-ku, Hiroshima 730-8504 Japan (Patrick Martin, Seaside, OR).

KVNS 1700 AM. Full data QSL card unsigned, plus coverage map. Received in 325 days for an AM report and mint stamps. Station address: 901 East Pike Blvd., Weslaco, TX 78596 USA (J. Munoz, San Antonio, TX).

PALAU

Radio Free Asia via KHBN. Full data *Year of the Ox* card, transmitter site only noted as Asia. Received in 16 days for an email report to *qsl@rfa.org*. Same card and days for RFA-Iranawila, Sri Lanka (Kusalik) US contact address: 2025 M. Street NW, Suite 300, Washington, DC 20036 USA. Website: www.techweb.rfa.org

PHILIPPINES

Radyo Pilipinas, 15285 kHz. QSL card unsigned plus station sticker. Received in one month and 16 days. Station address: Philippine Broadcasting Service, 4th Floor, PIA Building, Visayas Avenue, Quezon City 1100, Metro Manila, Philippines (Peter Ng, Malaysia). Full data card signed by Ric G. Lorenzo-Audience Relations, 11730 in 85 days (T.J. Banks, Dallas, TX)

ST. HELENA

Radio St. Helena, 11092 kHz. Full data color map/logo/ZC7RSD card signed by Gary Walter-Station Manager. Received in 151 days for report of St. Helena Day 2008 broadcast. Station address: P.O. Box 93, Jamestown, St. Helena, STHL 1ZZ South Atlantic Ocean (Frank Hillton, Charleston, SC).

THAILAND

Radio Liberty, 7270 via Udon Thani relay. Full data RFE Prague studio card with site. Received in 15 days for an English report. QSL address: 1201 Connecticut Avenue NW, Washington, DC 20036 USA (Banks).

Streaming/on-demand audio www.rferl.org

UNITED ARAB EMIRATES

Sudan Radio Service relay, 13720 kHz. No data email plus attached no data confirmation letter from Michael R. Tamburo-Marketing Director. Received in 48 days for email to: *mtamburo@sundanradio.org*. US contact address: Sudan Radio Service, EDC, 1000 Potomac Street NW, Suite 350, Washington, DC 20007 USA (Albert Muick)

UTILITY

HLL, Seoul, South Korea 9165 kHz USB. Verification letter from Heung-yeon Choi. Also enclosed two blank cards for 6K0CE. Received in 21 days for a utility report and $2.00US. Station address; Meteorological Radio transmissions Station, 538, GongHang-dog, GangSeo-gu Seoul 157-240, Republic of Korea (Martin Foltz, CA/UDXF)

Murmansk Radio-UDK 2, 13050 kHz USB. Prepared QSL card returned as verified, signed by Chif Sokolov V.L. Received in 19 days. Station address: 183031 Murmansk,Halatina 11-89, Russia (Vladimir Rozhkov, Russia/UDXF)

Standard Time & Frequency Station-Radio Station CHU, 7850 kHz. Full data Sandford Fleming color card, unsigned. Received in 32 days for an English report and mint stamps (used for reply). Station address: INMS/National Research Council of Canada, 1200 Montreal Road, Bldg. M-36, Ottawa, Ontario K1A OR6 Canada (Wilkins).

Vladivostok Radio-UFZ, 12799.5 kHz. Verification letter and English/Russian prepared QSL card signed by Chif Sokolov V.L. Received in 37 days for utility report and $1.00US. Station address: Primorrybsvyaz, Radiocentre UFZ, Okeanskiy prospect, 89 a, Vladivostok 690002, Russia (Foltz)

USA

Radio EDXP program via WWCR, 5070 kHz. Full data Maria Island, Tasmania card, signed by Bob Padula-QSL Manager. Received in 13 days for an English report and one IRC. WWCR address: F.W. Robbert Broadcasting Co., 1300 WWCR Avenue, Nashville, TN 37218 USA (Wilkins).

Streaming audio www.wwcr.com

Additional QSLs, tips and information excluded for space constraints are posted at the *Shortwave Central Blog* http://mt-shortwave.blogspot.com/

How to Use the Shortwave Guide

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af

① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ① , then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

Mode used by all stations in this guide is AM unless otherwise indicated.

MT Monitoring Team

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Thank You …

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Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.

Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.

Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007

Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

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0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0000		UK, BBC World Service	5970as	6195as	
			7395as	9410as	9740as	11955as
			13725as	15335as	15360as	
0000	0004		Canada, R Canada International		6100am	
0000	0020		Japan, NHK World Radio Japan		5960eu	
			6145na	13650as	17810as	
0000	0027		Czech Rep, Radio Prague	7345na	9440na	
0000	0030		Egypt, Radio Cairo	11590na		
0000	0030		Thailand, Radio Thailand World Svc		15275na	
0000	0030		USA, Voice of America	7555me		
0000	0045		India, All India Radio	9705as	9950as	
			11620as	11645as		
0000	0045		USA, WYFR/Family Radio Worldwide		17805na	
0000	0056		Romania, R Romania International		6135na	
			9580na			
0000	0057		Canada, R Canada International		11700as	
0000	0100		Anguilla, Worldwide Univ Network		6090am	
0000	0100		Australia, ABC NT Alice Springs		2310do	
			4835do			
0000	0100		Australia, ABC NT Katherine	5025do		
0000	0100		Australia, ABC NT Tennant Creek		4910do	
0000	0100		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	17715as	17750va
			17775va	17795va		
0000	0100		Canada, CFRX Toronto ON	6070na		
0000	0100		Canada, CFVP Calgary AB	6030na		
0000	0100		Canada, CKZN St John's NF	6160na		
0000	0100		Canada, CKZU Vancouver BC	6160na		
0000	0100		China, China Radio International		6020na	
			6075as	6180as	7415as	9570na
			11790as	11885as	13750as	15125as
0000	0100		Germany, Deutsche Welle	9885as	15595as	
			17525as			
0000	0100		Guyana, Voice of Guyana	3291do		
0000	0100		Malaysia, RTM/Traxx FM	7295do		
0000	0100	DRM	New Zealand, Radio NZ International		13730pa	
0000	0100		New Zealand, Radio NZ International		15720pa	
0000	0100	vl	Papua New Guinea, Wantok R. Light		7325do	
0000	0100		Russia, Voice of Russia	9480sa	9665sa	
0000	0100		Spain, Radio Exterior Espana	6055na		
0000	0100		Ukraine, R Ukraine International		7440na	
0000	0100		USA, American Forces Network		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12132usb	13362usb	
0000	0100		USA, EWTN Vandiver AL	11520af		
0000	0100		USA, WBCQ Monticello ME	5110am	7415am	
0000	0100		USA, WBOH Newport NC	5920am		
0000	0100		USA, WHRA Greenbush ME	7385eu		
0000	0100		USA, WHRI Cypress Creek SC		5875na	
			7315va	7385na		
0000	0100		USA, WINB Red Lion PA	9265am		
0000	0100		USA, WRMI Miami FL	9955ca		
0000	0100		USA, WTJC Newport NC	9370na		
0000	0100		USA, WWCR Nashville TN	5070na	5935na	
			7465na	9980na		
0000	0100		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6890va		
0000	0100		USA, WYFR/Family Radio Worldwide		5950na	
			6985na	9505sa	15440am	
0000	0100	vl	Zambia CVC/ The Voice Africa		4965af	
0005	0100	twhfa	Canada, R Canada International		6100am	
0025	0100		Sri Lanka, SLBC	6005as	9770as	15745as
0030	0045	twhfas	Albania, Radio Tirana	9345na		
0030	0045	Sun	Germany, Pan American BC	9640as		
0030	0058	mtwhfa	Serbia, International Radio of Serbia		9675na	
0030	0100		Australia, Radio Australia	15415as		
0030	0100		China, China Radio International		11730as	
0030	0100		Thailand, Radio Thailand World Svc		12120na	
0030	0100	asf	UK, Bible Voice Broadcasting	9490as		
0030	0100		USA, Voice of America	7430as	9715as	
			9780as	11725as	15205as	
0030	0100		Uzbekistan, CVC Intl-The Voice Asia		11800as	

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0104	twhfa	Canada, R Canada International		6100am	
0100	0125		Vietnam, Voice of Vietnam	6175na		
0100	0127		Czech Rep, Radio Prague	6200na	7345na	
0100	0127		Slovakia, R Slovakia International		5930am	
			9440am			
0100	0128		Serbia, International Radio of Serbia		9675na	
0100	0130		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	17715as	17750va
			17775va	17795va		
0100	0157		North Korea, Voice of Korea	7140as	9345as	
			9730as	11735sa	13760sa	15180sa
0100	0159		Canada, R Canada International		9620as	
0100	0200		Anguilla, Worldwide Univ Network		6090am	
0100	0200		Australia, ABC NT Katherine	5025do		
0100	0200		Australia, ABC NT Tennant Creek		4910do	
0100	0200		Canada, CFRX Toronto ON	6070na		
0100	0200		Canada, CFVP Calgary AB	6030na		
0100	0200		Canada, CKZN St John's NF	6160na		
0100	0200		Canada, CKZU Vancouver BC	6160na		
0100	0200		China, China Radio International		6080na	
			6175as	9410eu	9470eu	9535as
			9580na	9790na	11870as	15125as
			15785as			
0100	0200		Cuba, Radio Havana Cuba	6000na	6140na	
0100	0200		Guyana, Voice of Guyana	3291do		
0100	0200		Malaysia, RTM/Traxx FM	7295do		
0100	0200	DRM	New Zealand, Radio NZ International		13730pa	
0100	0200		New Zealand, Radio NZ International		15720pa	
0100	0200		Palau, T8WH/World Harvest	15710as		
0100	0200	vl	Papua New Guinea, Wantok R. Light		7325do	
0100	0200		Russia, Voice of Russia	9480sa	9665sa	
0100	0200		Sri Lanka, SLBC	6005as	9770as	15745as
0100	0200		Taiwan, R Taiwan International		11875as	
0100	0200		UK, BBC World Service	7395as	9410as	
			9740as	11750as	11955as	15310as
			15335as	15360as	17615as	
0100	0200		USA, American Forces Network		4319usb	
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
0100	0200		USA, EWTN Vandiver AL	11520af		
0100	0200		USA, KJES Vado NM	7555na		
0100	0200		USA, Voice of America	7430as	9780as	
			11705as			
0100	0200	m	USA, WBCQ Monticello ME	5110am		
0100	0200	mtwhfa	USA, WBCQ Monticello ME	7415am		
0100	0200		USA, WBOH Newport NC	5920am		
0100	0200		USA, WHRA Greenbush ME	7385eu		
0100	0200		USA, WHRI Cypress Creek SC		5875na	
			7385na			
0100	0200	mtwhf	USA, WHRI Cypress Creek SC		5850na	
0100	0200	Sat/Sun	USA, WHRI Cypress Creek SC		7315na	
0100	0200		USA, WINB Red Lion PA	9265am		
0100	0200		USA, WRMI Miami FL	9955ca		
0100	0200		USA, WRNO New Orleans LA	7505am		
0100	0200		USA, WTJC Newport NC	9370na		
0100	0200		USA, WWCR Nashville TN	3215na	5070na	
			5935na	9980na		
0100	0200		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6890va		
0100	0200		USA, WYFR/Family Radio Worldwide		5950na	
			6985na	9505na	15440am	
0100	0200		Uzbekistan, CVC Intl-The Voice Asia		11790as	
			11880as			
0100	0200	vl	Zambia CVC/ The Voice Africa		4965af	
0130	0200		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	15415as	17715as
			17750va	17795va		
0130	0200		Iran, VOIRI/ IRIB	7235na	9495na	
0130	0200		Sweden, Radio Sweden	6010na		
0130	0200	twhfa	USA, Voice of America	6040ca	9820ca	
0140	0200		Vatican City, Vatican Radio	5915as	7335as	
0145	0200	twhfas	Albania, Radio Tirana	7425na		

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0227		Iran, VOIRI/ IRIB	7235na	9495na	
0200	0230		Thailand, Radio Thailand World Svc		15275na	
0200	0230		USA, KJES Vado NM	7555na		
0200	0245		USA, WYFR/Family Radio Worldwide		11835am	
0200	0257		North Korea, Voice of Korea	13650as	15100as	
0200	0258	Sun	Lithuania, Mighty KBC Radio	6110na		
0200	0300		Anguilla, Worldwide Univ Network		6090am	
0200	0300		Argentina, Radio Nacional RAE		11710am	
0200	0300		Australia, ABC NT Alice Springs		2310do	
			4835do			
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek		4910do	
0200	0300		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	15415as	15515as
			17750va	21725va		
0200	0300	DRM	Bulgaria, Radio Bulgaria	9500na		
0200	0300		Bulgaria, Radio Bulgaria	9700na	11700na	
0200	0300		Canada, CFRX Toronto ON	6070na		
0200	0300		Canada, CFVP Calgary AB	6030na		

0200	0300		Canada, CKZN St John's NF	6160na			
0200	0300		Canada, CKZU Vancouver BC	6160na			
0200	0300		China, China Radio International				11770as
			13640as				
0200	0300		Cuba, Radio Havana Cuba	6000na	6140na		
0200	0300		Egypt, Radio Cairo	7540na			
0200	0300		Guyana, Voice of Guyana	3291do			
0200	0300		Indonesia, Voice of Indonesia	9526va	11784al		
0200	0300		Malaysia, RTM/Traxx FM	7295do			
0200	0300	DRM	New Zealand, Radio NZ International		13730pa		
0200	0300		New Zealand, Radio NZ International		15720pa		
0200	0300		Palau, T8WH/World Harvest	15710as			
0200	0300	vl	Papua New Guinea, Wantok R. Light		7325do		
0200	0300		Philippines, Radyo Pilipinas	11880va	15285va		
			15510va				
0200	0300		Russia, Voice of Russia	9480sa	9665sa		
			15425na				
0200	0300		South Korea, KBS World Radio		9580sa		
0200	0300		Sri Lanka, SLBC	6005as	9770as	15745as	
0200	0300		Taiwan, R Taiwan International		5950na		
			9680na				
0200	0300	vl	Uganda, UBC Radio	4976do			
0200	0300		UK, BBC World Service	6005af	6195me		
			9410eu	11955as	15310as		
0200	0300		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
0200	0300		USA, EWTN Vandiver AL	11520af			
0200	0300	m	USA, WBCQ Monticello ME	5110am			
0200	0300	mtwhfa	USA, WBCQ Monticello ME	7415am			
0200	0300		USA, WBOH Newport NC	5920am			
0200	0300		USA, WHRA Greenbush ME	7385eu			
0200	0300		USA, WHRI Cypress Creek SC		5875na		
			7315va	7385na			
0200	0300		USA, WINB Red Lion PA	9265am			
0200	0300	sm	USA, WRMI Miami FL	9955ca			
0200	0300	twhfa	USA, WRMI Miami FL	9955am			
0200	0300		USA, WRNO New Orleans LA	7505am			
0200	0300		USA, WTJC Newport NC	9370na			
0200	0300		USA, WWCR Nashville TN	3215na	5070na		
			5890na	5935na			
0200	0300		USA, WWRB Manchester TN	3185va	5050va		
			5745va	6890va			
0200	0300	vl	USA, WYFR/Family Radio Worldwide		9385va		
0200	0300		USA, WYFR/Family Radio Worldwide		5985sa		
			6985na	9505na	9680am	11855sa	
0200	0300		Uzbekistan, CVC Intl-The Voice Asia		11790as		
			11880as				
0200	0300	vl	Vatican City, Vatican Radio	9310va	12070va		
0200	0300	vl	Zambia CVC/ The Voice Africa		4965af		
0215	0230		Nepal, Radio Nepal	5005as			
0230	0255		Vietnam, Voice of Vietnam	6175na			
0230	0300	twhfas	Albania, Radio Tirana	7425na			
0230	0300		China, China Radio International		15435as		
0230	0300		Malaysia, RTM/Voice of Malaysia		15295pa		
0230	0300		Sweden, Radio Sweden	6010na	11550va		
0245	0300		Australia, HCJB Global	15400as			
0250	0300		Vatican City, Vatican Radio	6040na	7305na		
0255	0300	vl	Rwanda, Radio Rwanda	6055do			

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0320		Vatican City, Vatican Radio	6040am	7305na		
			9545as				
0300	0327		Czech Rep, Radio Prague	7345na	9870na		
0300	0330		Egypt, Radio Cairo	7540na			
0300	0330		Philippines, Radyo Pilipinas	11880va	15285va		
			15510va				
0300	0330		Uzbekistan, CVC Intl-The Voice Asia		11800as		
			11880as				
0300	0330	vl	Vatican City, Vatican Radio	7360af	9310va		
			9660af	12070va			
0300	0355		Turkey, Voice of Turkey	5975va	6165me		
			7325na				
0300	0356		Romania, R Romania International		6150na		
			9645na	9735as	11895as		
0300	0357		North Korea, Voice of Korea	7140as	9345as		
			9730as				
0300	0400		Anguilla, Worldwide Univ Network		6090am		
0300	0400		Australia, ABC NT Alice Springs		2310do		
			4835do				
0300	0400		Australia, ABC NT Katherine	5025do			
0300	0400		Australia, ABC NT Tennant Creek		4910do		
0300	0400		Australia, Radio Australia	9660as	12080as		
			13690as	15240pa	15415as	15515as	
			17750va	21725va			
0300	0400	twhfas	Canada, CBC NQ SW Service	9625na			
0300	0400		Canada, CFRX Toronto ON	6070na			
0300	0400		Canada, CFVP Calgary AB	6030na			
0300	0400		Canada, CKZN St John's NF	6160na			
0300	0400		Canada, CKZU Vancouver BC	6160na			
0300	0400		China, China Radio International		9690na		
			9790na	11770as	13750as	15110as	
			15120as	15785as			
0300	0400		Cuba, Radio Havana Cuba	6000na	6140na		
0300	0400		Germany, Deutsche Welle	11975as	13770as		
			15595as				
0300	0400		Guyana, Voice of Guyana	3291do			
0300	0400		Malaysia, RTM/Traxx FM	7295do			
0300	0400		Malaysia, RTM/Voice of Malaysia		6175as		
			9750as	15295as			
0300	0400		New Zealand, Radio NZ International		15720pa		
0300	0400	DRM	New Zealand, Radio NZ International		13730pa		
0300	0400		Oman, Radio Oman	15355as			
0300	0400		Palau, T8WH/World Harvest	15700as			
0300	0400	vl	Papua New Guinea, Wantok R. Light		7325do		
0300	0400	DRM	Russia, Voice of Russia	15735as			
0300	0400		Russia, Voice of Russia	9665sa	15425na		
			15585as	15755as			
0300	0400	vl	Rwanda, Radio Rwanda	6055do			
0300	0400		South Africa, Channel Africa	3345af	6135af		
0300	0400		Sri Lanka, SLBC	6005as	9770as	15745as	
0300	0400		Sweden, Radio Sweden	6010na			
0300	0400		Taiwan, R Taiwan International		5950na		
			15320as				
0300	0400		UK, BBC World Service	3255af	6005af		
			6145af	6190af	6195as	7255af	
			9410eu	9750af	12035af	12095as	
			15310as	17790as			
0300	0400		Ukraine, R Ukraine International		7440na		
0300	0400		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
0300	0400		USA, EWTN Vandiver AL	11520af			
0300	0400		USA, Voice of America	4930af	6080af		
			9885af	15580af			
0300	0400	twhfa	USA, WBCQ Monticello ME	7415am			
0300	0400		USA, WBOH Newport NC	5920am			
0300	0400		USA, WHRA Greenbush ME	7385eu			
0300	0400		USA, WHRI Cypress Creek SC		5875na		
			7315na	7385na			
0300	0400		USA, WRMI Miami FL	9955am			
0300	0400		USA, WRNO New Orleans LA	7505am			
0300	0400		USA, WTJC Newport NC	9370na			
0300	0400		USA, WWCR Nashville TN	3215na	5070na		
			5890na	5935na			
0300	0400		USA, WWRB Manchester TN	3185va	5050va		
			5745va	6890va			
0300	0400		USA, WYFR/Family Radio Worldwide		6915na		
			6985na	11740na	15255am		
0300	0400	vl	USA, WYFR/Family Radio Worldwide		9385va		
0300	0400		Uzbekistan, CVC Intl-The Voice Asia		13680as		
0300	0400	vl	Zambia CVC/ The Voice Africa		4965af		
0330	0355		Vietnam, Voice of Vietnam	6175na			
0330	0357		Czech Rep, Radio Prague	6080na	9445na		
			11600na				
0330	0400	twhfas	Albania, Radio Tirana	7425na			
0330	0400		UK, BBC World Service	11945af			
0330	0400		Uzbekistan, CVC Intl-The Voice Asia		15555as		

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0430		Australia, Radio Australia	9660as	12080as		
			13690as	15240pa	15515as	17750va	
			21725va				
0400	0430	mtwhf	France, Radio France International		9805af		
			11995af				
0400	0445		USA, WYFR/Family Radio Worldwide		6985na		
			9505na				
0400	0458		New Zealand, Radio NZ International		15720pa		
0400	0458	DRM	New Zealand, Radio NZ International		13730pa		
0400	0500		Anguilla, Worldwide Univ Network		6090am		
0400	0500		Australia, ABC NT Alice Springs		2310do		
			4835do				
0400	0500		Australia, ABC NT Katherine	5025do			
0400	0500		Australia, ABC NT Tennant Creek		4910do		
0400	0500	twhfas	Canada, CBC NQ SW Service	9625na			
0400	0500		Canada, CFRX Toronto ON	6070na			
0400	0500		Canada, CKZN St John's NF	6160na			
0400	0500		Canada, CKZU Vancouver BC	6160na			
0400	0500		China, China Radio International		6020na		
			6080na	6190na	13750as	15120as	

			15785as	17730as	17855as		
0400	0500		Cuba, Radio Havana Cuba	6000na	6140na		
0400	0500		Germany, Deutsche Welle	6180af	7245af		
			12045af	15445af			
0400	0500		Guyana, Voice of Guyana	3291do			
0400	0500		Malaysia, RTM/Traxx FM	7295do			
0400	0500		Malaysia, RTM/Voice of Malaysia	6175as			
			9750as	15295as			
0400	0500		Palau, T8WH/World Harvest	15700as			
0400	0500	vl	Papua New Guinea, Wantok R. Light	7325do			
0400	0500		Russia, Voice of Russia	13755na	15585as		
			15755as				
0400	0500	DRM	Russia, Voice of Russia	15735as			
0400	0500	vl	Rwanda, Radio Rwanda	6055do			
0400	0500		South Africa, Channel Africa	3345af			
0400	0500		Sri Lanka, SLBC	6005as	9770as	15745as	
0400	0500	vl	Uganda, UBC Radio	4976do			
0400	0500	DRM	UK, BBC World Service	3995eu			
0400	0500		UK, BBC World Service	3255af	6005af		
			6190af	7255af	7310af	9410eu	
			11945af	12035af	12095as	13675eu	
			15310as	15360as	17790as		
0400	0500		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
0400	0500		USA, EWTN Vandiver AL	11520af			
0400	0500		USA, Voice of America	4930af	4960af		
			6080af	9885af	15580af		
0400	0500		USA, WBOH Newport NC	5920am			
0400	0500		USA, WHRA Greenbush ME	7385eu			
0400	0500		USA, WHRI Cypress Creek SC	5875na			
			7315va	7385na			
0400	0500	smtwhf	USA, WHRI Cypress Creek SC	5850na			
0400	0500	Sat	USA, WHRI Cypress Creek SC	9825na			
0400	0500		USA, WRMI Miami FL	9955am			
0400	0500		USA, WTJC Newport NC	9370na			
0400	0500		USA, WWCR Nashville TN	3215na	5070na		
			5890na	5935na			
0400	0500		USA, WWRB Manchester TN	3185va	5745va		
0400	0500		USA, WYFR/Family Radio Worldwide	5950na			
			6915na	9680na			
0400	0500		Uzbekistan, CVC Intl-The Voice Asia	13680as			
			15555as				
0400	0500	vl	Zambia CVC/ The Voice Africa	4965af			
			9430af				
0430	0500		Australia, Radio Australia	9660as	12080as		
			13690as	15240pa	15415as	15515as	
			17750va	21725va			
0430	0500	mtwh	Italy, NEXUS/IRRS	5990va			
0430	0500		Nigeria, Radio Nigeria/Kaduna	6090do			
0450	0500		Swaziland, TWR	3200af			
0459	0500		New Zealand, Radio NZ International	11725pa			
0459	0500	DRM	New Zealand, Radio NZ International	11675pa			

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0507	twhfas	Canada, CBC NQ SW Service	9625na			
0500	0525		Swaziland, TWR	3200af			
0500	0530		Australia, Radio Australia	9660as	12080as		
			13690as	15160as	15240pa	15515as	
			17750va				
0500	0530	mtwhf	France, Radio France International	11995af			
			13680af				
0500	0530		Germany, Deutsche Welle	6180af	7430af		
			9700af	9825af			
0500	0530	mtwh	Italy, NEXUS/IRRS	5990va			
0500	0530		Japan, NHK World Radio Japan	5975eu			
			6110na	11970af	15325as	17810as	
0500	0530		Vatican City, Vatican Radio	4005eu	5965eu		
			7250eu	9660af	11625af	13765af	
0500	0600		Anguilla, Worldwide Univ Network	6090am			
0500	0600		Australia, ABC NT Alice Springs	2310do			
			4835do				
0500	0600		Australia, ABC NT Katherine	5025do			
0500	0600		Australia, ABC NT Tennant Creek	4910do			
0500	0600		Bhutan, Bhutan Broadcasting Svc	6035as			
0500	0600		Canada, CFRX Toronto ON	6070na			
0500	0600		Canada, CKZN St John's NF	6160na			
0500	0600		Canada, CKZU Vancouver BC	6160na			
0500	0600		China, China Radio International	6020na			
			11710af	11880as	11895as	15350as	
			15465as	17505va	17540as	17730as	
			17855as				
0500	0600		Cuba, Radio Havana Cuba	6000na	6010na		
			6140na	11760na			
0500	0600	DRM	Germany, Deutsche Welle	17525as			
0500	0600		Guyana, Voice of Guyana	3291do			
0500	0600		Kuwait, Radio Kuwait	15110va			
0500	0600		Malaysia, RTM/Traxx FM	7295do			
0500	0600		Malaysia, RTM/Voice of Malaysia	6175as			
			9750as	15295as			
0500	0600		New Zealand, Radio NZ International	11725pa			
0500	0600	DRM	New Zealand, Radio NZ International	11675pa			
0500	0600		Nigeria, Radio Nigeria/Kaduna	4770do			
0500	0600		Palau, T8WH/World Harvest	15700as			
0500	0600	vl	Papua New Guinea, Wantok R. Light	7325do			
0500	0600		Russia, Voice of Russia	13755na			
0500	0600		South Africa, Channel Africa	7230af			
0500	0600		Taiwan, R Taiwan International	5950na			
0500	0600	vl	Uganda, UBC Radio	4976do			
0500	0600		UK, BBC World Service	3255af	3995eu		
			6005af	6190af	7255af	7310af	
			9410eu	11945af	12095as	15310as	
			15360as	15420af	15565eu	17640af	
			17790as				
0500	0600	DRM	UK, BBC World Service	3995af			
0500	0600		Ukraine, R Ukraine International	9945eu			
0500	0600		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
0500	0600		USA, EWTN Vandiver AL	11520af			
0500	0600		USA, Voice of America	4930af	6080af		
			12080af	15580af			
0500	0600		USA, WBOH Newport NC	5920am			
0500	0600		USA, WHRA Greenbush ME	7390af			
0500	0600		USA, WHRI Cypress Creek SC	5875na			
			7390va	11565na			
0500	0600	mtwhfa	USA, WHRI Cypress Creek SC	7390va			
0500	0600	Sun	USA, WHRI Cypress Creek SC	7365na			
0500	0600		USA, WRMI Miami FL	9955am			
0500	0600		USA, WTJC Newport NC	9370na			
0500	0600		USA, WWCR Nashville TN	3215na	5070na		
			5890na	5935na			
0500	0600		USA, WWRB Manchester TN	3185va			
0500	0600		USA, WYFR/Family Radio Worldwide	5950na			
			6915na	9680na			
0500	0600		Uzbekistan, CVC Intl-The Voice Asia	13680as			
			15555as				
0500	0600	vl	Zambia CVC/ The Voice Africa	4965af			
			9430af				
0515	0530	vl	Rwanda, Radio Rwanda	6055do			
0530	0556		Romania, R Romania International	7305eu			
			9655eu	15345pa	17760pa		
0530	0600		Australia, Radio Australia	9660as	12080as		
			13690as	15160as	15240pa	15415as	
			15515as	17750va			
0530	0600		China, Central People's BS/CNR	9530do			
			11685do	15570do			
0530	0600	vl	Rwanda, Radio Rwanda	6055do			
0530	0600		Thailand, Radio Thailand World Svc	17655va			

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0603		Croatia, Voice of Croatia	7355eu			
0600	0615	Sat/Sun	South Africa, Trans World Radio	11640af			
0600	0630	Sat/Sun	Australia, Radio Australia	15180as	15290as		
0600	0630		Australia, Radio Australia	9660as	11650as		
			12080as	13690as	15160as	15240pa	
			15515as	17750va			
0600	0630	mtwhf	France, Radio France International	9765af			
			11610af	15160af	17800af		
0600	0630		Germany, Deutsche Welle	7310af	15275af		
0600	0630		Nigeria, Radio, National Svc/Abuja	7275do			
0600	0645	mtwhf	South Africa, Trans World Radio	11640af			
0600	0645		Swaziland, TWR	11640af			
0600	0658		New Zealand, Radio NZ International	11725pa			
0600	0658	DRM	New Zealand, Radio NZ International	11675pa			
0600	0700		Anguilla, Worldwide Univ Network	6090am			
0600	0700		Australia, ABC NT Alice Springs	2310do			
			4835do				
0600	0700		Australia, ABC NT Katherine	5025do			
0600	0700		Australia, ABC NT Tennant Creek	4910do			
0600	0700		Canada, CFRX Toronto ON	6070na			
0600	0700		Canada, CFVP Calgary AB	6030na			
0600	0700		Canada, CKZN St John's NF	6160na			
0600	0700		Canada, CKZU Vancouver BC	6160na			
0600	0700		China, China Radio International	11710af			
			11870as	11880as	11895as	13660as	
			15140as	15350as	15465as	17505va	
			17540as	17710as			
0600	0700		Cuba, Radio Havana Cuba	6000na	6010na		
			6140na	11760na			

0600	0700	DRM	Germany, Deutsche Welle	3995eu	6130eu
0600	0700		Greece, Voice of Greece	11645eu	
0600	0700		Guyana, Voice of Guyana	3291do	
0600	0700		Kuwait, Radio Kuwait	15110va	
0600	0700	vl	Liberia, ELWA	4760do	
0600	0700		Malaysia, RTM/Traxx FM	7295do	
0600	0700		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0600	0700		Nigeria, Radio Nigeria/Kaduna		4770do
0600	0700		Palau, T8WH/World Harvest	15700as	
0600	0700	vl	Papua New Guinea, Wantok R. Light		7325do
0600	0700		Russia, Voice of Russia	17635pa	
0600	0700		South Africa, Channel Africa	7230af	15255af
0600	0700		UK, BBC World Service	3995eu	6005af
			6190af	9410af	9860af	11765af
			12015af	12095as	15310as	17640af
			17790as			
0600	0700	Sat/Sun	UK, BBC World Service	15420af	
0600	0700		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
0600	0700		USA, EWTN Vandiver AL	11520af	
0600	0700		USA, Voice of America	6080af	12080af
			15580af			
0600	0700		USA, WBOH Newport NC	5920am	
0600	0700		USA, WHRA Greenbush ME	7390af	
0600	0700		USA, WHRI Cypress Creek SC		5875va
			7365na	7390va	11565na	
0600	0700		USA, WRMI Miami FL	9955am	
0600	0700		USA, WTJC Newport NC	9370na	
0600	0700		USA, WWCR Nashville TN	3215na	5070na
			5890na	5935na	
0600	0700		USA, WWRB Manchester TN	3185va	
0600	0700		USA, WYFR/Family Radio Worldwide		5850eu
			7520sa	9680na	11530va	11580va
0600	0700		Uzbekistan, CVC Intl-The Voice Asia		15555as
0600	0700	vl	Vanuatu, Radio Vanuatu	7260do	
0600	0700	vl	Zambia CVC/ The Voice Africa		6065af
			13590af		
0630	0645		Vatican City, Vatican Radio	4005eu	5965eu
			7250eu	9645eu	11740eu	15595me
0630	0700		Australia, Radio Australia	9660as	11650as
			12080as	13690as	15160as	15240pa
			15415as	15515as	17750va	
0630	0700		Bulgaria, Radio Bulgaria	9600eu	11600eu
0630	0700		Swaziland, TWR	3200af	
0645	0700	Sun	Germany, TWR Europe	6105eu	
0645	0700	Sun	Monaco, TWR Europe	9800eu	
0659	0700		New Zealand, Radio NZ International		6170pa
0659	0700	DRM	New Zealand, Radio NZ International		7285pa

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0727		Czech Rep, Radio Prague	9880eu	11600na
0700	0727		Slovakia, R Slovakia International		9440va
			11650va		
0700	0730		France, Radio France International		13675af
0700	0730	Sun	UK, Bible Voice Broadcasting	5945eu	
0700	0745		USA, WYFR/Family Radio Worldwide		7520eu
0700	0750	smtwhf	Germany, TWR Europe	6105eu	
0700	0750	smtwhf	Monaco, TWR Europe	9800eu	
0700	0800		Anguilla, Worldwide Univ Network		6090am
0700	0800		Australia, ABC NT Alice Springs		2310do
			4835do		
0700	0800		Australia, ABC NT Katherine	5025do	
0700	0800		Australia, ABC NT Tennant Creek		4910do
0700	0800		Australia, Radio Australia	9475as	9660as
			9710as	11650as	11945as	12080as
			13630pa	15160va	15240pa	17750va
0700	0800		Bhutan, Bhutan Broadcasting Svc		6035as
0700	0800		Canada, CFRX Toronto ON	6070na	
0700	0800		Canada, CFVP Calgary AB	6030na	
0700	0800		Canada, CKZN St John's NF	6160na	
0700	0800		Canada, CKZU Vancouver BC	6160na	
0700	0800		China, China Radio International		11880as
			11895as	13660as	13710eu	15125as
			15350as	15465as	17490eu	17540as
			17710as			
0700	0800	DRM	Germany, Deutsche Welle	5790eu	9545eu
0700	0800		Guyana, Voice of Guyana	3291do	
0700	0800		Kuwait, Radio Kuwait	15110va	
0700	0800	Sat	Latvia, Radio SWH	9290eu	
0700	0800	vl	Liberia, ELWA	4760do	
0700	0800		Malaysia, RTM/Traxx FM	7295do	
0700	0800		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0700	0800		Myanmar, Myanma Radio	9731do	
0700	0800		New Zealand, Radio NZ International		6170pa
0700	0800	DRM	New Zealand, Radio NZ International		7285pa
0700	0800		Nigeria, Radio Nigeria/Kaduna		4770do
0700	0800		Palau, T8WH/World Harvest	9930as	15700as
0700	0800	vl	Papua New Guinea, R East New Britain		3385do
0700	0800	vl	Papua New Guinea, Wantok R. Light		7325do
0700	0800		Russia, Voice of Russia	17635as	21790as
0700	0800	vl	Solomon Islands, SIBC	5020do	
0700	0800		South Africa, Channel Africa	7230af	
0700	0800		Swaziland, TWR	3200af	
0700	0800	Sat/Sun	UK, BBC World Service	15420af	
0700	0800		UK, BBC World Service	5790eu	6190af
			9860af	11760me	11765af	13820af
			15310af	15400af	15575as	17790as
			17830af			
0700	0800		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
0700	0800		USA, EWTN Vandiver AL	11520af	
0700	0800		USA, WBOH Newport NC	5920am	
0700	0800		USA, WHRA Greenbush ME	11565pa	
0700	0800		USA, WHRI Cypress Creek SC		7385va
			7390na	11565na	
0700	0800		USA, WRMI Miami FL	9955am	
0700	0800		USA, WTJC Newport NC	9370na	
0700	0800		USA, WWCR Nashville TN	3215na	5070na
			5890na	5935na	
0700	0800		USA, WWRB Manchester TN	3185va	
0700	0800		USA, WYFR/Family Radio Worldwide		5950na
			5985na	6915na	9385am	9505af
0700	0800		Uzbekistan, CVC Intl-The Voice Asia		15555as
0700	0800	vl	Vanuatu, Radio Vanuatu	7260do	
0700	0800	vl	Zambia CVC/ The Voice Africa		6065af
			13590af		
0715	0750	Sat	Germany, TWR Europe	6105eu	
0715	0750	Sat	Monaco, TWR Europe	9800eu	
0730	0800		Australia, HCJB Global	11750pa	
0730	0800	Sat	UK, Bible Voice Broadcasting	5945eu	
0745	0800	f	UK, Bible Voice Broadcasting	5945eu	

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0815	Sat	UK, Bible Voice Broadcasting	5945eu	
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek		4910do
0800	0830		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0800	0830		Myanmar, Myanma Radio	9731do	
0800	0845		USA, WYFR/Family Radio Worldwide		5950na
			9385af		
0800	0900		Anguilla, Worldwide Univ Network		6090am
0800	0900		Australia, ABC NT Alice Springs		2310do
			4835do		
0800	0900		Australia, HCJB Global	11750pa	
0800	0900		Australia, Radio Australia	5995as	9475as
			9580va	9590as	9710as	11945pa
			12080as	13630pa		
0800	0900		Bhutan, Bhutan Broadcasting Svc		6035as
0800	0900		Canada, CFRX Toronto ON	6070na	
0800	0900		Canada, CFVP Calgary AB	6030na	
0800	0900		Canada, CKZN St John's NF	6160na	
0800	0900		Canada, CKZU Vancouver BC	6160na	
0800	0900		China, China Radio International		11620as
			11880as	11895as	13710eu	15125af
			15350as	15465as	15625as	17490eu
			17540as			
0800	0900	DRM	Germany, Deutsche Welle	9545eu	12095as
			13810eu			
0800	0900		Guyana, Voice of Guyana	3291do	
0800	0900	Sat	Italy, NEXUS/IRRS	9510va	
0800	0900	vl	Liberia, ELWA	4760do	
0800	0900		Malaysia, RTM/Traxx FM	7295do	
0800	0900		New Zealand, Radio NZ International		6170pa
0800	0900	DRM	New Zealand, Radio NZ International		7285pa
0800	0900		Nigeria, Radio Nigeria/Kaduna		4770do
0800	0900		Nigeria, Voice of Nigeria/Lagos		9690af
0800	0900		Palau, T8WH/World Harvest	9930as	15700as
0800	0900	vl	Papua New Guinea, R East New Britain		3385do
0800	0900	vl	Papua New Guinea, Wantok R. Light		7325do
0800	0900		Russia, Voice of Russia	17635as	21790as
0800	0900	DRM	Russia, Voice of Russia	12060eu	
0800	0900	vl	Solomon Islands, SIBC	5020do	
0800	0900		South Africa, Channel Africa	9625af	
0800	0900	Sun	South Africa, SA Radio League		7205af
			17570af		

0800	0900		South Korea, KBS World Radio				9570as
0800	0900		Swaziland, TWR 6120af				
0800	0900		UK, BBC World Service		6190af		9860af
			11760me	15310as	15400af		15575as
			17640af	17790as	17830af		21470af
0800	0900		USA, American Forces Network				4319usb
			5446usb	5765usb	6350usb		7811usb
			10320usb	12133usb	13362usb		
0800	0900		USA, EWTN Vandiver AL		11520af		
0800	0900		USA, KNLS Anchor Point AK		7355as		
0800	0900		USA, WBOH Newport NC		5920am		
0800	0900		USA, WHRA Greenbush ME		11565pa		
0800	0900		USA, WHRI Cypress Creek SC				7385va
			11565na				
0800	0900		USA, WRMI Miami FL		9955am		
0800	0900		USA, WTJC Newport NC		9370na		
0800	0900		USA, WWCR Nashville TN		3215na		5070na
			5890na	5935na			
0800	0900		USA, WWRB Manchester TN		3185va		
0800	0900		USA, WYFR/Family Radio Worldwide				5985am
			6915na				
0800	0900		Uzbekistan, CVC Intl-The Voice Asia				15555as
0800	0900	vl	Vanuatu, Radio Vanuatu		7260do		
0800	0900	vl	Zambia CVC/ The Voice Africa				6065af
			13590af				
0805	0900	thf	Guam, KTWR/TWR		15190as		
0820	0900	w	Guam, KTWR/TWR		15170as		
0830	0900		Australia, ABC NT Katherine		2485do		
0830	0900		Australia, ABC NT Tennant Creek				2325do
0830	0900		Australia, CVC International		15555as		
0835	0900	m	Guam, KTWR/TWR		15170as		
0855	0900	mtwhf	Guam, KTWR/TWR		11840pa		

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0927		Czech Rep, Radio Prague		9880am		9955na
			21745af				
0900	0930		Australia, HCJB Global		11750pa		
0900	0930	mtwhf	Guam, KTWR/TWR		11840pa		
0900	0930		Japan, NHK World Radio Japan				9625pa
			9825pa	11815as	15590as		
0900	0930		Uzbekistan, CVC Intl-The Voice Asia				15555as
0900	1000		Anguilla, Worldwide Univ Network				6090am
0900	1000		Australia, ABC NT Alice Springs				2310do
			4835do				
0900	1000		Australia, ABC NT Katherine		2485do		
0900	1000		Australia, ABC NT Tennant Creek				2325do
0900	1000		Australia, Radio Australia		9475va		9580va
			9590va	11945as	12080as		
0900	1000		Canada, CFRX Toronto ON		6070na		
0900	1000		Canada, CFVP Calgary AB		6030na		
0900	1000		Canada, CKZN St John's NF		6160na		
0900	1000		Canada, CKZU Vancouver BC		6160na		
0900	1000		China, China Radio International				11620as
			15210va	15270eu	15350as		15625af
			17490eu	17570eu	17690va		17750as
0900	1000		Germany, Deutsche Welle		15340as		17705as
0900	1000	DRM	Germany, Deutsche Welle		9545eu		13810eu
0900	1000		Guyana, Voice of Guyana		3291do		
0900	1000	vl	Liberia, ELWA 4760do				
0900	1000		Malaysia, RTM/Traxx FM		7295do		
0900	1000		New Zealand, Radio NZ International				6170pa
0900	1000	DRM	New Zealand, Radio NZ International				7285pa
0900	1000		Nigeria, Radio Nigeria/Kaduna				4770do
0900	1000		Nigeria, Voice of Nigeria/Lagos				9690af
0900	1000		Palau, T8WH/World Harvest		9930as		15700as
0900	1000	vl	Papua New Guinea, R East New Britain				3385do
0900	1000	vl	Papua New Guinea, Wantok R. Light				7325do
0900	1000		Russia, Voice of Russia		15470as		15610as
			21790as				
0900	1000	DRM	Russia, Voice of Russia		12060eu		
0900	1000	vl	Solomon Islands, SIBC		5020do		
0900	1000		South Africa, Channel Africa		9625af		
0900	1000		Swaziland, TWR 6120af				
0900	1000		UK, BBC World Service		6190af		6195as
			9740as	9860af	11760me		15310as
			15400af	15575as	17640af		17760as
			17790as	17830af	21470af		21660as
0900	1000		Ukraine, R Ukraine International				11550eu
0900	1000		USA, American Forces Network				4319usb
			5446usb	5765usb	6350usb		7811usb
			10320usb	12133usb	13362usb		
0900	1000		USA, EWTN Vandiver AL		11640as		
0900	1000		USA, WBOH Newport NC		5920am		
0900	1000		USA, WHRA Greenbush ME		11565pa		
0900	1000		USA, WHRI Cypress Creek SC				7385va
			11565na				
0900	1000	smtwhf	USA, WHRI Cypress Creek SC				9425na
0900	1000	Sat	USA, WHRI Cypress Creek SC				7465na
0900	1000		USA, WRMI Miami FL		9955am		
0900	1000		USA, WTJC Newport NC		9370na		
0900	1000		USA, WWCR Nashville TN		5070na		5890na
			5935na	9985na			
0900	1000		USA, WWRB Manchester TN		3185va		
0900	1000		USA, WYFR/Family Radio Worldwide				5950na
			6915na	9755as			
0900	1000	vl	Vanuatu, Radio Vanuatu		7260do		
0900	1000	vl	Zambia CVC/ The Voice Africa				6065af
			13590af				
0915	0930	Sat	Guam, KTWR/TWR		11840pa		
0930	1000		Australia, CVC International		15555as		
0930	1000	Sun	Italy, NEXUS/IRRS 9510va				

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1004		Pakistan, Radio Pakistan		15100as		17835as
1000	1030		Vietnam, Voice of Vietnam		9840as		12020as
1000	1057		Netherlands, R Netherlands Worldwide				11895as
			12065as	15110as			
1000	1057		North Korea, Voice of Korea		11710sa		11735as
			13650as	15180sa			
1000	1058		New Zealand, Radio NZ International				6170pa
1000	1100		Anguilla, Worldwide Univ Network				11775am
1000	1100		Australia, ABC NT Alice Springs				2310do
			4835do				
1000	1100		Australia, ABC NT Katherine		2485do		
1000	1100		Australia, ABC NT Tennant Creek				2325do
1000	1100		Australia, CVC International		15555as		
1000	1100		Australia, Radio Australia		9475va		9580va
			9590va	11945as	12080as		
1000	1100		Canada, CFRX Toronto ON		6070na		
1000	1100		Canada, CFVP Calgary AB		6030na		
1000	1100		Canada, CKZN St John's NF		6160na		
1000	1100		Canada, CKZU Vancouver BC		6160na		
1000	1100		China, China Radio International				6040na
			6090as	11610as	11635as		11750na
			13590as	13620as	13720as		15190as
			15350as	17490eu			
1000	1100	DRM	Germany, Deutsche Welle		9545eu		13810eu
1000	1100		Guyana, Voice of Guyana		3291do		
1000	1100		India, All India Radio		7270as		13695va
			15070as	15260as	15410pa		17510pa
			17800pa	17895pa			
1000	1100		Indonesia, Voice of Indonesia		9526va		11784al
1000	1100	Sun	Italy, NEXUS/IRRS 9510va				
1000	1100		Malaysia, RTM/Traxx FM		7295do		
1000	1100	DRM	New Zealand, Radio NZ International				7285pa
1000	1100		Nigeria, Radio Nigeria/Kaduna				4770do
1000	1100		Nigeria, Voice of Nigeria/Lagos				9690af
1000	1100		Palau, T8WH/World Harvest		9930as		15700as
1000	1100	vl	Papua New Guinea, R East New Britain				3385do
1000	1100	vl	Papua New Guinea, Wantok R. Light				7325do
1000	1100		Russia, Voice of Russia		15470as		15610as
1000	1100		Saudi Arabia, BSKSA		15250af		
1000	1100	vl	Solomon Islands, SIBC		5020do		
1000	1100		South Africa, Channel Africa		9625af		
1000	1100		Swaziland, TWR 6120af				
1000	1100	Sat/Sun	UK, BBC World Service		15400af		17830af
1000	1100		UK, BBC World Service		6190af		6195as
			9545eu	9740as	9860af		11760me
			15310af	15575as	17640af		17760as
			17790as	21470af	21660as		
1000	1100		USA, American Forces Network				4319usb
			5446usb	5765usb	6350usb		7811usb
			10320usb	12133usb	13362usb		
1000	1100		USA, EWTN Vandiver AL		11640as		
1000	1100		USA, KNLS Anchor Point AK		6890as		
1000	1100		USA, WBOH Newport NC		5920am		
1000	1100		USA, WHRA Greenbush ME		11565pa		
1000	1100		USA, WHRI Cypress Creek SC				7385va
			11565na				
1000	1100		USA, WINB Red Lion PA		9265am		
1000	1100		USA, WRMI Miami FL		9955am		
1000	1100		USA, WTJC Newport NC		9370na		
1000	1100		USA, WWCR Nashville TN		5070na		5890na
			5935na	9985na			
1000	1100		USA, WWRB Manchester TN		3185va		
1000	1100		USA, WYFR/Family Radio Worldwide				5950na
			6890na	6915na	9450sa		9555sa
1000	1100	vl	Zambia CVC/ The Voice Africa				6065af
			13590af				
1015	1045	Sun	UK, Bible Voice Broadcasting		5910as		

1030	1057		Czech Rep, Radio Prague	9880eu	11665eu	
1030	1100		Iran, VOIRI/ IRIB	15600as	17660as	
1030	1100		Mongolia, Voice of Mongolia	9665as	12085as	
1059	1100		New Zealand, Radio NZ International	9655pa		

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1103	mtwhf	Croatia, Voice of Croatia	6165eu		
1100	1127		Iran, VOIRI/ IRIB	15600as	17660as	
1100	1130		Australia, CVC International	15555as		
1100	1130		China, China Radio International	6060as		
1100	1130	f/ DRM	Japan, NHK World Radio Japan	9760eu		
1100	1130		Vietnam, Voice of Vietnam	7285as		
1100	1145		USA, WYFR/Family Radio Worldwide	9550am		
			9755sa			
1100	1156		Romania, R Romania International	11775af		
			15210af	15430af	17730af	
1100	1158	DRM	New Zealand, Radio NZ International	7285pa		
1100	1200		Anguilla, Worldwide Univ Network	11775am		
1100	1200		Australia, ABC NT Alice Springs	2310do		
			4835do			
1100	1200		Australia, ABC NT Katherine	2485do		
1100	1200		Australia, ABC NT Tennant Creek	2325do		
1100	1200	DRM	Australia, Radio Australia	5995pa		
1100	1200		Australia, Radio Australia	6020va	9475as	
			9560as	9580va	9590va	11945as
1100	1200	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1100	1200		Canada, CFRX Toronto ON	6070na		
1100	1200		Canada, CFVP Calgary AB	6030na		
1100	1200		Canada, CKZN St John's NF	6160na		
1100	1200		Canada, CKZU Vancouver BC	6160na		
1100	1200		China, China Radio International	5955as		
			6040na	11650as	11660as	11795as
			13645as	13650eu	13790eu	17490eu
1100	1200	DRM	Germany, Deutsche Welle	9545eu	13810eu	
1100	1200	Sun	Italy, NEXUS/IRRS	9510va		
1100	1200		Malaysia, RTM/Traxx FM	7295do		
1100	1200		New Zealand, Radio NZ International	9655pa		
1100	1200		Nigeria, Radio Nigeria/Kaduna	4770do		
1100	1200		Nigeria, Voice of Nigeria/Lagos	9690af		
1100	1200		Palau, T8WH/World Harvest	9930as	15700as	
1100	1200	vl	Papua New Guinea, R East New Britain	3385do		
1100	1200	vl	Papua New Guinea, Wantok R. Light	7325do		
1100	1200		Russia, Voice of Russia	12065as	15470as	
1100	1200		Saudi Arabia, BSKSA	15250af		
1100	1200	vl	Solomon Islands, SIBC	5020do	9545al	
1100	1200		South Africa, Channel Africa	9625af		
1100	1200		Taiwan, R Taiwan International	7445as		
			11715as			
1100	1200		UK, BBC World Service	6190af	6195as	
			9740as	9860af	9545eu	11760me
			15310as	15340as	15400af	15575as
			17640af	17760as	17790as	17830af
			21470af			
1100	1200		Ukraine, R Ukraine International	11550eu		
1100	1200		USA, American Forces Network	4319usb		
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
1100	1200		USA, EWTN Vandiver AL	11640as		
1100	1200		USA, WBOH Newport NC	5920am		
1100	1200	mtwhf	USA, WHRA Greenbush ME	7315am		
1100	1200		USA, WHRI Cypress Creek SC	7315va		
			7385va			
1100	1200		USA, WINB Red Lion PA	9265am		
1100	1200		USA, WRMI Miami FL	9955am		
1100	1200		USA, WTJC Newport NC	9370na		
1100	1200		USA, WWCR Nashville TN	5890na	5935na	
			7490na	15825na		
1100	1200		USA, WWRB Manchester TN	3185va		
1100	1200		USA, WYFR/Family Radio Worldwide	5950af		
			5985na	7730sa	9625sa	
1100	1200	vl	Zambia CVC/ The Voice Africa	6065af		
			13590af			
1115	1130	mtwhfa	UK, Bible Voice Broadcasting	5945as		
1115	1145	Sun	UK, Bible Voice Broadcasting	5945as		
1130	1200		Australia, CVC International	13635as		
1130	1200		Bulgaria, Radio Bulgaria	11700eu	15700eu	
1130	1200		Vatican City, Vatican Radio	15565me	17765me	
1130	1200		Vietnam, Voice of Vietnam	9840as	12020as	

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1225		Saudi Arabia, BSKSA	15250af		
1200	1230		China, China Radio International	11780as		
1200	1230		France, Radio France International	17800af		
			21620af			
1200	1230		Germany, AWR-Europe	15435as		
1200	1230		Japan, NHK World Radio Japan	6120na		
			9625pa	9695as	9790eu	
1200	1245		Australia, HCJB Global	15400as		
1200	1245		USA, WYFR/Family Radio Worldwide	5950na		
			5985na			
1200	1258		New Zealand, Radio NZ International	9655pa		
1200	1300		Anguilla, Worldwide Univ Network	11775am		
1200	1300		Australia, ABC NT Alice Springs	2310do		
			4835do			
1200	1300		Australia, ABC NT Katherine	2485do		
1200	1300		Australia, ABC NT Tennant Creek	2325do		
1200	1300		Australia, CVC International	13635as		
1200	1300		Australia, Radio Australia	6020va	9475as	
			9560pa	9580va	9590va	11945as
1200	1300	DRM	Australia, Radio Australia	5995va	12080pa	
1200	1300	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1200	1300		Canada, CFRX Toronto ON	6070na		
1200	1300		Canada, CFVP Calgary AB	6030na		
1200	1300		Canada, CKZN St John's NF	6160na		
1200	1300		Canada, CKZU Vancouver BC	6160na		
1200	1300		China, China Radio International	5955as		
			9460as	9600as	9645as	9730as
			9760va	11650as	11660as	11690as
			11760va	11980as	13645as	13650eu
			17490eu			
1200	1300	DRM	Germany, Deutsche Welle	9545eu	13810eu	
1200	1300	Sun	Latvia, Radio SWH	9290eu		
1200	1300	vl	Libya, Voice of Africa	17725af	21695af	
1200	1300		Malaysia, RTM/Traxx FM	7295do		
1200	1300		Nigeria, Radio Nigeria/Kaduna	4770do		
1200	1300		Nigeria, Voice of Nigeria/Lagos	9690af		
1200	1300		Palau, T8WH/World Harvest	9930as	12130as	
1200	1300	vl	Papua New Guinea, Wantok R. Light	7325do		
1200	1300		Poland, Polish Radio	7330eu	9525eu	
1200	1300		Russia, Voice of Russia	7330as	12065as	
			15470as			
1200	1300	vl	Solomon Islands, SIBC	5020do	9545al	
1200	1300		South Korea, KBS World Radio	9650na		
1200	1300		UK, BBC World Service	5875as	6190af	
			6195as	9545eu	9740as	9860af
			11750as	11760me	15310as	15575as
			17640af	17790as	17830af	21470af
1200	1300		USA, American Forces Network	4319usb		
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
1200	1300		USA, EWTN Vandiver AL	11530as		
1200	1300		USA, KNLS Anchor Point AK	7355as	9780as	
1200	1300		USA, Voice of America	6140va	7575va	
			9510va	9760va	12075va	
1200	1300		USA, WBOH Newport NC	5920am		
1200	1300	mtwhf	USA, WHRA Greenbush ME	7315am		
1200	1300		USA, WHRI Cypress Creek SC	7315va		
			7385va			
1200	1300		USA, WINB Red Lion PA	9265am		
1200	1300		USA, WRMI Miami FL	9955am		
1200	1300		USA, WTJC Newport NC	9370na		
1200	1300		USA, WWCR Nashville TN	7490na	9980na	
			13845na	15825na		
1200	1300		USA, WWRB Manchester TN	9385va		
1200	1300		USA, WYFR/Family Radio Worldwide	17555am		
			17795na			
1200	1300	vl	Zambia CVC/ The Voice Africa	6065af		
			13590af			
1230	1300		Bangladesh, Bangla Betar	7250as		
1230	1300		Thailand, Radio Thailand World Svc	9890va		
1230	1300		Turkey, Voice of Turkey	15420eu	15520as	
1230	1300		Vietnam, Voice of Vietnam	9840as	12020as	
1245	1300	smtwhf	Australia, HCJB Global	15400as		

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1325		Turkey, Voice of Turkey	15450eu	15520as	
1300	1327		Czech Rep, Radio Prague	13580af	17540af	
1300	1330	vl	Australia, HCJB Global	15400as		
1300	1330		Egypt, Radio Cairo	17835as		
1300	1357		North Korea, Voice of Korea	9335na	11710na	
			13760eu	15245eu		
1300	1400		Anguilla, Worldwide Univ Network	11775am		
1300	1400		Australia, CVC International	13635as		
1300	1400		Australia, Radio Australia	6020va	9560as	
			9580va	9590va		
1300	1400	DRM	Australia, Radio Australia	5995va	12080pa	
1300	1400	Sat/Sun	Canada, CBC NQ SW Service	9625na		
1300	1400		Canada, CFRX Toronto ON	6070na		

1300	1400		Canada, CFVP Calgary AB	6030na			
1300	1400		Canada, CKZN St John's NF	6160na			
1300	1400		Canada, CKZU Vancouver BC	6160na			
1300	1400		China, China Radio International	5995as			
			9570na	9650na	9730as	9760va	
			9870as	11660as	11980as	13610eu	
			13755as	13790eu	15260na		
1300	1400		Indonesia, Voice of Indonesia	9526va	11784al		
1300	1400	vl	Libya, Voice of Africa	17725af	21695af		
1300	1400		Malaysia, RTM/Traxx FM	7295do			
1300	1400		New Zealand, Radio NZ International	6170pa			
1300	1400		Nigeria, Radio Nigeria/Kaduna	4770do			
1300	1400		Nigeria, Voice of Nigeria/Lagos	9690af			
1300	1400		Palau, T8WH/World Harvest	9930as			
1300	1400	vl	Papua New Guinea, Wantok R. Light	7325do			
1300	1400		Russia, Voice of Russia	7330as	12065as		
1300	1400	vl	Solomon Islands, SIBC	5020do	9545al		
1300	1400		South Korea, KBS World Radio	9570na			
			9770as				
1300	1400	DRM	UK, BBC World Service	9545eu	13810eu		
1300	1400		UK, BBC World Service	5875as	6190af		
			6195as	9545eu	9740as	9860af	
			11760me	15310as	15420af	15575as	
			17640af	17790as	17830af	21470af	
1300	1400		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
1300	1400		USA, EWTN Vandiver AL	11530as			
1300	1400		USA, KJES Vado NM	11715na			
1300	1400		USA, Voice of America	7575va	9510va		
			9760va				
1300	1400		USA, WBOH Newport NC	5920am			
1300	1400	Sat/Sun	USA, WHRA Greenbush ME	15195va			
1300	1400		USA, WHRI Cypress Creek SC	7315va			
1300	1400	Sat/Sun	USA, WHRI Cypress Creek SC	9840va			
			15195na				
1300	1400		USA, WINB Red Lion PA	9265am			
1300	1400		USA, WRMI Miami FL	9955am			
1300	1400		USA, WTJC Newport NC	9370na			
1300	1400		USA, WWCR Nashville TN	7490na	9980na		
			13845na	15825na			
1300	1400		USA, WWRB Manchester TN	9385va			
1300	1400		USA, WYFR/Family Radio Worldwide	11830am			
			11865na	11910na	13810as	17795na	
1300	1400	vl	Zambia CVC/ The Voice Africa	6065af			
			13590af				
1310	1340		Japan, NHK World Radio Japan	11985as			
1330	1357	fa/ DRM	Czech Rep, Radio Prague	9850eu			
1330	1400	mtwhfa	Guam, KSDA/ AWR	15275as			
1330	1400	hfa	Guam, KSDA/ AWR	11880as			
1330	1400		India, All India Radio	9690as	11620as		
			13710as				
1330	1400		Laos, National Radio	7145as			
1330	1400		Sweden, Radio Sweden	15735va			
1330	1400		Vietnam, Voice of Vietnam	9840as	12020as		

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	Sat	Germany, Pan American BC	15205me			
1400	1427		Czech Rep, Radio Prague	9955na			
1400	1430		Australia, Radio Australia	5995va	6080va		
			7240va	9590va			
1400	1430		China, China Radio International	7325as			
1400	1430	Sun	Germany, Pan American BC	15205as			
1400	1430	`	Japan, NHK World Radio Japan	11705as			
			11985as	13630eu	21560af		
1400	1430		Thailand, Radio Thailand World Svc	9455va			
1400	1430	Sun	United Arab Emirates, FEBA	12025as			
1400	1457		Netherlands, R Netherlands Worldwide	5825as			
			7530as	9345as	11835as	15815as	
1400	1500		Anguilla, Worldwide Univ Network	11775am			
1400	1500		Australia, CVC International	13635as			
1400	1500		Australia, HCJB Global	15425as			
1400	1500		Bhutan, Bhutan Broadcasting Svc	6035as			
1400	1500	Sat/Sun	Canada, CBC NQ SW Service	9625na			
1400	1500		Canada, CFRX Toronto ON	6070na			
1400	1500		Canada, CFVP Calgary AB	6030na			
1400	1500		Canada, CKZN St John's NF	6160na			
1400	1500		Canada, CKZU Vancouver BC	6160na			
1400	1500		China, China Radio International	5955as			
			9870as	11675as	11765as	13740na	
			13710eu	13790eu			
1400	1500		Germany, CVC Intl-Christian Vision	17770af			
1400	1500		Germany, Overcomer Ministries	6110eu			
			13810va				
1400	1500		India, All India Radio	9690as	11620as		
			13710as				
1400	1500	vl	Libya, Voice of Africa	17725af	21695af		
1400	1500		Malaysia, RTM/Traxx FM	7295do			
1400	1500		New Zealand, Radio NZ International	6170pa			
1400	1500		Nigeria, Radio Nigeria/Kaduna	4770do			
1400	1500		Nigeria, Voice of Nigeria/Lagos	9690af			
1400	1500		Oman, Radio Oman	15140as			
1400	1500		Palau, T8WH/World Harvest	9930as	9965as		
1400	1500	vl	Papua New Guinea, Wantok R. Light	7325do			
1400	1500		Russia, Voice of Russia	6045as	7330as		
			9850as	15605as			
1400	1500	DRM	Russia, Voice of Russia	9445as	9750eu		
1400	1500	vl	Solomon Islands, SIBC	5020do	9545al		
1400	1500		UK, BBC World Service	5875as	6190af		
			6195as	7230af	9545eu	9740as	
			11920as	12095as	15310as	17640af	
			17830af	21470af			
1400	1500	DRM	UK, BBC World Service	9545eu	15780eu		
1400	1500	Sat/Sun	UK, Bible Voice Broadcasting	17805as			
1400	1500		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
1400	1500		USA, EWTN Vandiver AL	11530as			
1400	1500		USA, KJES Vado NM	11715na			
1400	1500		USA, KNLS Anchor Point AK	7355as			
1400	1500		USA, Voice of America	4930af	6080af		
			7430as	7575as	9760as	11715as	
			13570af	15530va	15580af	17585af	
1400	1500		USA, WBOH Newport NC	5920am			
1400	1500	Sat/Sun	USA, WHRA Greenbush ME	15195va			
1400	1500		USA, WHRI Cypress Creek SC	15195na			
1400	1500	Sat/Sun	USA, WHRI Cypress Creek SC	9840va			
1400	1500		USA, WINB Red Lion PA	13570am			
1400	1500		USA, WRMI Miami FL	9955am			
1400	1500		USA, WTJC Newport NC	9370na			
1400	1500		USA, WWCR Nashville TN	7490na	9980na		
			13845na	15825na			
1400	1500		USA, WWRB Manchester TN	9385va			
1400	1500		USA, WYFR/Family Radio Worldwide	9365as			
			9615as	9865as	11725as	13810as	
1400	1500	vl	Zambia CVC/ The Voice Africa	6065af			
			13590af				
1415	1430		Nepal, Radio Nepal	5005as			
1415	1450		Guam, KTWR/TWR	9975as			
1430	1445	Sun	Germany, Pan American BC	15205as			
1430	1445	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu			
1430	1500	mtwhfa	Albania, Radio Tirana	13625na			
1430	1500		Australia, Radio Australia	5995va	6080va		
			7240va	9475as	9590va	11660pa	
1430	1500		China, Central People's BS/CNR	6010do			
			7350do	9480do			
1430	1500		Ethiopia, Radio Ethiopia	5990af	7110af		
			9704af				
1430	1500	DRM	South Korea, KBS World Radio	9660eu			
1430	1500		Sweden, Radio Sweden	13820va			

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu			
1500	1528		Vietnam, Voice of Vietnam	7285va	9840va		
			12020va				
1500	1530		Australia, HCJB Global	15425as			
1500	1530		China, China Radio International	9600as			
1500	1530		Guam, KSDA/ AWR	11720as			
1500	1530		Nigeria, Radio, National Svc/Abuja	7275do			
1500	1530		UK, BBC World Service	7385af	11860af		
			15420af				
1500	1530	Sat	UK, Bible Voice Broadcasting	15295as			
1500	1530		UK, Sudan Radio Service	17745af			
1500	1545		USA, WYFR/Family Radio Worldwide	15770sa			
1500	1550		New Zealand, Radio NZ International	6170pa			
1500	1557		Canada, R Canada International	11675va			
			17720va				
1500	1557	vl	Libya, Voice of Africa	17725af	21695af		
1500	1557		North Korea, Voice of Korea	9335na	11710na		
			13760eu	15245eu			
1500	1600		Anguilla, Worldwide Univ Network	11775am			
1500	1600		Australia, CVC International	11730as			
1500	1600		Australia, Radio Australia	5995va	6080va		
			7240va	9475as	9590va	11660pa	
1500	1600	Sat/Sun	Canada, CBC NQ SW Service	9625na			
1500	1600		Canada, CFRX Toronto ON	6070na			
1500	1600		Canada, CFVP Calgary AB	6030na			
1500	1600		Canada, CKZN St John's NF	6160na			
1500	1600		Canada, CKZU Vancouver BC	6160na			
1500	1600	DRM	Canada, R Canada International	9800na			

1500	1600		China, China Radio International				5955as
			6095as	7160as	7325as	7405as	
			9720as	9800as	9870as	11965eu	
			13640as	13740na			
1500	1600		Germany, CVC Intl-Christian Vision				17770af
1500	1600		Germany, Overcomer Ministries				13810af
			17485af				
1500	1600		Italy, NEXUS/IRRS	15650af			
1500	1600		Malaysia, RTM/Traxx FM		7295do		
1500	1600		Myanmar, Myanma Radio		5985as		
1500	1600		Nigeria, Radio Nigeria/Kaduna				4770do
1500	1600		Nigeria, Voice of Nigeria/Lagos				9690af
1500	1600		Palau, T8WH/World Harvest		9965as		
1500	1600	vl	Papua New Guinea, Wantok R. Light				7325do
1500	1600		Russia, Voice of Russia		4975me		9625as
			9660as	9735me	9850as	11985me	
			12040eu	15605as			
1500	1600	vl	Solomon Islands, SIBC		5020do		9545al
1500	1600		Uganda, Dunamis Shortwave		4750af		
1500	1600	DRM	UK, BBC World Service		5790eu		15780eu
1500	1600		UK, BBC World Service		5790eu		5875as
			5975as	6190af	6195as	7230af	
			7385af	9740as	11920as	12095eu	
			15310af	15400af	17640af	17830af	
			21470af				
1500	1600		USA, American Forces Network				4319usb
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
1500	1600		USA, EWTN Vandiver AL		15610eu		
1500	1600		USA, Voice of America		4930af		6080af
			6160va	7545va	7575va	9485va	
			9700va	12005va	12150va	13570af	
			15530va	15550va	15580af	17895af	
1500	1600		USA, WBOH Newport NC		5920am		
1500	1600	Sat/Sun	USA, WHRA Greenbush ME		15195va		
1500	1600		USA, WHRI Cypress Creek SC				15195na
1500	1600	Sat/Sun	USA, WHRI Cypress Creek SC				9840va
			11785va				
1500	1600		USA, WINB Red Lion PA		13570am		
1500	1600		USA, WRMI Miami FL		9955am		
1500	1600		USA, WTJC Newport NC		9370na		
1500	1600		USA, WWCR Nashville TN		7490na		9980na
			13845na	15825na			
1500	1600		USA, WWRB Manchester TN		9385va		
1500	1600		USA, WYFR/Family Radio Worldwide				11830am
			11910na	17795na			
1500	1600	vl	Zambia CVC/ The Voice Africa				6065af
			13590af				
1515	1530	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie				7370eu
1530	1545		India, All India Radio		7255as		9820as
			9910as				
1530	1550		Vatican City, Vatican Radio		13765as		15235as
1530	1600		Germany, AWR-Europe		15335as		
1530	1600		Iran, VOIRI/ IRIB	7305as	9600as		9635as
1530	1600		Mongolia, Voice of Mongolia		9665as		12085as
1530	1600		Sweden, Radio Sweden		13600va		
1530	1600	Sat	UK, BBC World Service		7385af		15420af
1530	1600	Sun	UK, Bible Voice Broadcasting		13590me		
1530	1600	Sat	UK, Bible Voice Broadcasting		15680as		
1545	1600	mtwhfa	UK, Bible Voice Broadcasting		13590me		
1551	1600	DRM	New Zealand, Radio NZ International				6170pa
1551	1600		New Zealand, Radio NZ International				7285pa

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600	1605	Sun	Croatia, Voice of Croatia		6165eu		
1600	1615	mtwhfa	Croatia, Voice of Croatia		6165eu		
1600	1615	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie				7370eu
1600	1615		Pakistan, Radio Pakistan		9385va		11565va
			15100as				
1600	1615		UK, Bible Voice Broadcasting		13590me		
1600	1620	t	UK, Bible Voice Broadcasting		13590me		
1600	1627		Czech Rep, Radio Prague		5930eu		17845na
1600	1627		Iran, VOIRI/ IRIB	7305as	9600as		
1600	1628		Vietnam, Voice of Vietnam		7220va		7280va
			9550va	9730va			
1600	1630		Guam, KSDA/ AWR		11720as		11805as
1600	1630		Myanmar, Myanma Radio		9730do		
1600	1630		Nigeria, Voice of Nigeria/Lagos				9690af
1600	1630		Yemen, Rep of Yemen Radio		9780me		
1600	1645		USA, WYFR/Family Radio Worldwide				11830am
			11865na				
1600	1657		North Korea, Voice of Korea		9990va		11545va
1600	1700		Anguilla, Worldwide Univ Network				11775am
1600	1700		Australia, CVC International		9680as		
1600	1700		Australia, Radio Australia		5995va		6080va
			7240as	9475va	9580va	9710as	
			11660pa				
1600	1700	Sat	Canada, CBC NQ SW Service		9625na		
1600	1700		Canada, CFRX Toronto ON		6070na		
1600	1700		Canada, CFVP Calgary AB		6030na		
1600	1700		Canada, CKZN St John's NF		6160na		
1600	1700		Canada, CKZU Vancouver BC		6160na		
1600	1700		Canada, R Canada International				9515na
1600	1700		China, China Radio International				6095af
			6180as	7235as	7420af	9570af	
			9720af	9760as	11650eu	11900af	
			11940eu	11965eu	13760eu		
1600	1700		Egypt, Radio Cairo		12170af		
1600	1700		Ethiopia, Radio Ethiopia		7165af		9560af
1600	1700		France, Radio France International				15605af
			17605af				
1600	1700		Germany, CVC Intl-Christian Vision				17770af
1600	1700		Germany, Deutsche Welle		6170as		9485as
			9540as	15640as			
1600	1700		Italy, NEXUS/IRRS	15650af			
1600	1700		Malaysia, RTM/Traxx FM		7295do		
1600	1700	DRM	New Zealand, Radio NZ International				6170pa
1600	1700		New Zealand, Radio NZ International				7285pa
1600	1700		Nigeria, Radio Nigeria/Kaduna				4770do
1600	1700		Palau, T8WH/World Harvest		9965as		
1600	1700	vl	Papua New Guinea, Wantok R. Light				7325do
1600	1700		Russia, Voice of Russia		4975me		11985va
			12040af	13855af			
1600	1700	vl	Rwanda, Radio Rwanda		6055do		
1600	1700	vl	Solomon Islands, SIBC		5020do		9545al
1600	1700		South Korea, KBS World Radio				9515eu
1600	1700		Taiwan, R Taiwan International				11550as
			13840as				
1600	1700		Uganda, Dunamis Shortwave		4750af		
1600	1700		UK, BBC World Service		3255af		5790eu
			5975as	6190af	7385af	9625as	
			11920as	12095eu	15400af	17640af	
			17795af	17830af	21470af		
1600	1700	DRM	UK, BBC World Service		5790eu		11810eu
1600	1700	Sat	UK, BBC World Service		7385af		15420af
1600	1700	Sun	UK, Bible Voice Broadcasting		13590me		
1600	1700		USA, American Forces Network				4319usb
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
1600	1700		USA, EWTN Vandiver AL		15610eu		
1600	1700		USA, Voice of America		4930af		6080af
			9885af	12080va	13570va	15580af	
			17715af	17895va			
1600	1700		USA, WBOH Newport NC		5920am		
1600	1700		USA, WHRA Greenbush ME		17520af		
1600	1700		USA, WHRI Cypress Creek SC				9840va
			11785va	17520na			
1600	1700		USA, WINB Red Lion PA		13570am		
1600	1700		USA, WRMI Miami FL		9955ca		
1600	1700		USA, WTJC Newport NC		9370na		
1600	1700		USA, WWCR Nashville TN		9980na		12160na
			13845na	15825na			
1600	1700		USA, WWRB Manchester TN		9385va		
1600	1700		USA, WYFR/Family Radio Worldwide				6085sa
			13695as	17795na	18980af	21455eu	
			21525af				
1600	1700	vl	Zambia CVC/ The Voice Africa				4965af
			13590af				
1615	1630		Vatican City, Vatican Radio		4005eu		5885eu
			7250eu	9645eu	15595me		
1615	1700	Sun	UK, BBC World Service		7385af		11860af
			15420af				
1630	1645		UK, Bible Voice Broadcasting		13590me		
1630	1657		Slovakia, R Slovakia International				5920eu
			6055eu				
1630	1700		Guam, KSDA/ AWR		6190as		
1630	1700		Nigeria, Voice of Nigeria/Lagos				15120af
1630	1700	mtwhf	UK, BBC World Service		15420af		
1630	1700	Sat	UK, BBC World Service		11860af		
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio		4930eu		
1645	1700	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie				7370eu
1645	1700		Tajikistan, Tajik Radio		7245as		

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1704	DRM	Canada, R Canada International				9800na
1700	1727		Czech Rep, Radio Prague		5930eu		17485eu
1700	1728		Vietnam, Voice of Vietnam		9725pa		
1700	1730		Australia, CVC International		9680as		
1700	1730		USA, Voice of America		6080af		9885af
			11835af	15580af			

1700	1746		UK, BBC World Service	6005af		9410af	
1700	1750		New Zealand, Radio NZ International	7285pa			
1700	1750	DRM	New Zealand, Radio NZ International	6170pa			
1700	1756		Romania, R Romania International	9535eu			
			11735eu				
1700	1759	Sat	Canada, R Canada International	5850eu			
1700	1759		Poland, Polish Radio	9790eu			
1700	1759	DRM	Poland, Polish Radio	7265eu			
1700	1800		Anguilla, Worldwide Univ Network	11775am			
1700	1800		Australia, Radio Australia	5995va	6080va		
			9475as	9580va	9710as	11880as	
1700	1800	Sat	Canada, CBC NQ SW Service	9625na			
1700	1800		Canada, CFRX Toronto ON	6070na			
1700	1800		Canada, CFVP Calgary AB	6030na			
1700	1800		Canada, CKZN St John's NF	6160na			
1700	1800		Canada, CKZU Vancouver BC	6160na			
1700	1800		China, China Radio International	6060as			
			6090as	6140as	6145eu	6165as	
			7235as	7265as	7315va	7335eu	
			7410as	7420as	9570af	9695eu	
			11900af	11940eu	13760eu		
1700	1800		Egypt, Radio Cairo	12170af			
1700	1800		Equatorial Guinea, Radio Africa	15190af			
1700	1800		Germany, CVC Intl-Christian Vision	17770af			
1700	1800	DRM	Germany, Deutsche Welle	5790eu	9960eu		
1700	1800		Italy, NEXUS/IRRS	15650af			
1700	1800		Malaysia, RTM/Traxx FM	7295do			
1700	1800		Nigeria, Radio Nigeria/Kaduna	4770do			
1700	1800		Nigeria, Voice of Nigeria/Lagos	15120af			
1700	1800		Palau, T8WH/World Harvest	9965as			
1700	1800	vl	Papua New Guinea, Wantok R. Light	7325do			
1700	1800		Russia, Voice of Russia	4975me	11610me		
			11985af	12040af	12070af	13855af	
1700	1800	vl	Rwanda, Radio Rwanda	6055do			
1700	1800	vl	Solomon Islands, SIBC	5020eu	9545al		
1700	1800		South Africa, Channel Africa	15235af			
1700	1800		Taiwan, R Taiwan International	15690af			
1700	1800		Uganda, Dunamis Shortwave	4750af			
1700	1800	vl	Uganda, UBC Radio	4976do			
1700	1800		UK, BBC World Service	3255af	5790eu		
			5875eu	5975as	6190af	7400as	
			7405af	9625as	9960eu	12095af	
			13675eu	15400af	17795af	17830af	
1700	1800		UK, Bible Voice Broadcasting	13590me			
1700	1800	Sat	UK, Bible Voice Broadcasting	9430me			
1700	1800	Sun	UK, Bible Voice Broadcasting	13590me			
1700	1800		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
1700	1800		USA, EWTN Vandiver AL	15610na			
1700	1800	Sat/Sun	USA, Voice of America	15675af			
1700	1800		USA, WBCQ Monticello ME	15420am			
1700	1800		USA, WBOH Newport NC	5920am			
1700	1800		USA, WHRA Greenbush ME	17520af			
1700	1800		USA, WHRI Cypress Creek SC	11785va			
1700	1800	smtwhf	USA, WHRI Cypress Creek SC	9840va			
			17520na				
1700	1800	Sat	USA, WHRI Cypress Creek SC	9495va			
			17520na				
1700	1800		USA, WINB Red Lion PA	13570am			
1700	1800		USA, WRMI Miami FL	9955ca			
1700	1800		USA, WTJC Newport NC	9370na			
1700	1800		USA, WWCR Nashville TN	9980na	12160na		
			13845na	15825na			
1700	1800		USA, WWRB Manchester TN	9385va			
1700	1800		USA, WYFR/Family Radio Worldwide	13690na			
			17795na	18980af	21455eu		
1700	1800	vl	Zambia CVC/ The Voice Africa	4965af			
			13590af				
1720	1740	fas	USA, Voice of America	4930af	12080af		
			15775af				
1730	1800		Bulgaria, Radio Bulgaria	5900eu	7400eu		
1730	1800	DRM	Bulgaria, Radio Bulgaria	9400eu			
1730	1800	mtwhf	UK, Sudan Radio Service	9840af			
1730	1800		USA, Voice of America	6080af	9885af		
			15410af	15580af			
1730	1800		Vatican City, Vatican Radio	11625af	13765af		
			15570af				
1745	1800		Bangladesh, Bangla Betar	7250as			
1745	1800	DRM	India, All India Radio	9950eu			
1745	1800		India, All India Radio	7410eu	9445af		
			11620eu	11935af	13605as	15155af	
			17670af				
1751	1800	DRM	New Zealand, Radio NZ International	7285pa			
1751	1800		New Zealand, Radio NZ International	6170pa			

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1815	Sat	UK, Bible Voice Broadcasting	11970as			
1800	1815	Sun	UK, Bible Voice Broadcasting	13590me			
1800	1830		China, China Radio International	6020eu			
			7265eu				
1800	1830		Nigeria, Radio, National Svc/Abuja	7275do			
1800	1830		South Africa, AWR Africa	3215af	3345af		
			9610af				
1800	1830		UK, BBC World Service	5975as	6015as		
			9625as				
1800	1830	Sat	UK, Bible Voice Broadcasting	9430me			
1800	1830	Sat/Sun	USA, Voice of America	4930af			
1800	1850		New Zealand, Radio NZ International	6170pa			
1800	1850	DRM	New Zealand, Radio NZ International	7285pa			
1800	1857		Netherlands, R Netherlands Worldwide	6020af			
			15535af				
1800	1857		North Korea, Voice of Korea	13760eu	15245eu		
1800	1859		Canada, R Canada International	9530af			
			11765af	17735af	17810af		
1800	1900		Anguilla, Worldwide Univ Network	11775am			
1800	1900	mtwhf	Argentina, Radio Nacional RAE	9690eu			
			15345eu				
1800	1900		Australia, Radio Australia	6080va	7240as		
			9475va	9580as	9710as	11880as	
1800	1900		Bangladesh, Bangla Betar	7250eu			
1800	1900		Canada, CFRX Toronto ON	6070na			
1800	1900		Canada, CFVP Calgary AB	6030na			
1800	1900		Canada, CKZN St John's NF	6160na			
1800	1900		Canada, CKZU Vancouver BC	6160na			
1800	1900		China, China Radio International	6030eu			
			9600eu	13760eu			
1800	1900		Equatorial Guinea, Radio Africa	15190af			
1800	1900		Germany, CVC Intl-Christian Vision	17770af			
1800	1900	DRM	Germany, Deutsche Welle	5790eu	9960eu		
1800	1900	DRM	India, All India Radio	9950eu			
1800	1900		India, All India Radio	7410eu	9445af		
			11620eu	11935af	13605as	15155af	
			17670af				
1800	1900	fas	Italy, NEXUS/IRRS	7290va			
1800	1900		Kuwait, Radio Kuwait	11990va			
1800	1900		Malaysia, RTM/Traxx FM	7295do			
1800	1900		Nigeria, Radio Nigeria/Kaduna	4770do			
1800	1900		Nigeria, Voice of Nigeria/Lagos	15120af			
1800	1900		Palau, T8WH/World Harvest	9965as			
1800	1900	vl	Papua New Guinea, Wantok R. Light	7325do			
1800	1900		Russia, Voice of Russia	4975me	12040af		
			12070af				
1800	1900	vl	Rwanda, Radio Rwanda	6055do			
1800	1900	vl	Solomon Islands, SIBC	5020do	9545al		
1800	1900		South Korea, KBS World Radio	7275eu			
1800	1900		Taiwan, R Taiwan International	6155eu			
1800	1900	vl	Uganda, Dunamis Shortwave	4750af			
1800	1900	vl	Uganda, UBC Radio	4976do			
1800	1900		UK, BBC World Service	3255af	5790eu		
			5875eu	5995as	6190af	7405af	
			9485as	9660eu	11810af	12095af	
			13675eu	15400af	17795af		
1800	1900	Sun	UK, Bible Voice Broadcasting	6130va			
1800	1900		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
1800	1900		USA, EWTN Vandiver AL	15610na			
1800	1900		USA, KJES Vado NM	15385na			
1800	1900		USA, Voice of America	4930af	6080af		
			9885af	11975af	12080af	15410af	
			15580af				
1800	1900		USA, WBCQ Monticello ME	15420am			
1800	1900		USA, WBOH Newport NC	5920am			
1800	1900		USA, WHRA Greenbush ME	17520af			
1800	1900		USA, WHRI Cypress Creek SC	9840va			
			11785va	17520na			
1800	1900		USA, WINB Red Lion PA	13570am			
1800	1900		USA, WRMI Miami FL	9955ca			
1800	1900		USA, WTJC Newport NC	9370na			
1800	1900		USA, WWCR Nashville TN	9980na	12160na		
			13845na	15825na			
1800	1900		USA, WWRB Manchester TN	9385va			
1800	1900		USA, WYFR/Family Radio Worldwide	5910eu			
			6180af	7430eu	9405af	9465af	
			9770af	11875as	13830af	17795af	
			17845af	18930af	18940af		
1800	1900		Yemen, Rep of Yemen Radio	9780me			
1800	1900	vl	Zambia CVC/ The Voice Africa	4965af			
			13590af				
1805	1810	Sat	Croatia, Voice of Croatia	6165eu			

1805	1815	mtwhf	Croatia, Voice of Croatia	6165eu			
1830	1857		Slovakia, R Slovakia International	5920eu			
			6055eu				
1830	1858		Serbia, International Radio of Serbia	6100eu			
1830	1900		Turkey, Voice of Turkey	9785eu			
1830	1900		UK, BBC World Service	6005af	9410af		
1830	1900	f	UK, Bible Voice Broadcasting	9430me			
1845	1900	mtwhfa	Albania, Radio Tirana	7435eu	13640na		
1851	1900	DRM	New Zealand, Radio NZ International	9890pa			

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1925		Turkey, Voice of Turkey	9785eu			
1900	1928		Vietnam, Voice of Vietnam	7280va	9730va		
1900	1930		Germany, Deutsche Welle	6150af	11795af		
			13650af	17860af			
1900	1935	DRM	New Zealand, Radio NZ International	9890pa			
1900	1945		India, All India Radio	7410eu	9445af		
			11620eu	11935af	13605as	15155af	
			17670af				
1900	1945	DRM	India, All India Radio	9950eu			
1900	1945		USA, WYFR/Family Radio Worldwide	6085sa			
1900	1950		New Zealand, Radio NZ International	9615pa			
1900	1957		Netherlands, R Netherlands Worldwide	9480af			
			11660af	15335af			
1900	1957		North Korea, Voice of Korea	7100af	9975va		
			11910af	11535va			
1900	2000		Anguilla, Worldwide Univ Network	11775am			
1900	2000		Australia, Radio Australia	6080va	7240as		
			9500va	9580va	9710as	11880as	
1900	2000		Canada, CFRX Toronto ON	6070na			
1900	2000		Canada, CFVP Calgary AB	6030na			
1900	2000		Canada, CKZN St John's NF	6160na			
1900	2000		Canada, CKZU Vancouver BC	6160na			
1900	2000		China, China Radio International	7285eu			
			7295va	9435va	9440va		
1900	2000		Egypt, Radio Cairo	11510af			
1900	2000		Equatorial Guinea, Radio Africa	15190af			
1900	2000		Germany, CVC Intl-Christian Vision	17770af			
1900	2000	DRM	Germany, Deutsche Welle	3995eu	5875eu		
1900	2000		Germany, Overcomer Ministries	3975eu			
1900	2000	fas	Italy, NEXUS/IRRS 7290va				
1900	2000		Kuwait, Radio Kuwait	11990va			
1900	2000		Malaysia, RTM/Traxx FM	7295do			
1900	2000		Nigeria, Radio Nigeria/Kaduna	4770do			
1900	2000		Nigeria, Voice of Nigeria/Lagos	15120af			
1900	2000		Palau, T8WH/World Harvest	9965as			
1900	2000	vl	Papua New Guinea, Wantok R. Light	7325do			
1900	2000		Russia, Voice of Russia	12040af	12070af		
1900	2000	vl	Rwanda, Radio Rwanda	6055do			
1900	2000	vl	Solomon Islands, SIBC	5020do			
1900	2000	mtwhf	Spain, Radio Exterior Espana	9665eu	11620af		
1900	2000		Swaziland, TWR 3200af				
1900	2000		Thailand, Radio Thailand World Svc	7570eu			
1900	2000	vl	Uganda, UBC Radio	4976do			
1900	2000		UK, BBC World Service	3255af	3995eu		
			5875eu	5995as	6005af	6155as	
			6190af	9410af	11810af	12095af	
			15400af	17795af			
1900	2000	Sun	UK, Bible Voice Broadcasting	11830af			
1900	2000		Ukraine, R Ukraine International	7490eu			
1900	2000		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
1900	2000		USA, EWTN Vandiver AL	15610na			
1900	2000		USA, Voice of America	4930af	4940af		
			5990af	6080af	7480va	9780va	
			15580af	17895va			
1900	2000	smtwhf	USA, WBCQ Monticello ME	7415am			
1900	2000		USA, WBOH Newport NC	5920am			
1900	2000		USA, WHRA Greenbush ME	9840af			
1900	2000		USA, WHRI Cypress Creek SC	11785va			
1900	2000		USA, WINB Red Lion PA	13570am			
1900	2000		USA, WRMI Miami FL	9955ca			
1900	2000		USA, WTJC Newport NC	9370na			
1900	2000		USA, WWCR Nashville TN	9980na	12160na		
			13845na	15845na			
1900	2000		USA, WWRB Manchester TN	9385va			
1900	2000		USA, WYFR/Family Radio Worldwide	3230af			
			13615am	13690af	17795na	17845af	
			18930eu	18980eu			
1900	2000	vl	Zambia CVC/ The Voice Africa	4965af			
			5940af				
1905	2000	Mon	South Africa, SA Radio League	3215af			
1930	2000	Sat/Sun	Germany, Pan American BC	9515va			
1930	2000		Iran, VOIRI/ IRIB 5940eu	6205eu	7205eu		
			9800af	9925af			
1930	2000		South Africa, RTE Radio One	6225af			
1936	1950	DRM	New Zealand, Radio NZ International	9890pa			
1945	2000	mtwhf	UK, Bible Voice Broadcasting	11830af			
1945	2000	DRM	Vatican City, Vatican Radio	9800na			
1950	2000		New Zealand, Radio NZ International	11725pa			
1951	2000	DRM	New Zealand, Radio NZ International	9890pa			

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2005	Mon	South Africa, SA Radio League	3215af			
2000	2015	Sat/Sun	Germany, Pan American BC	9515va			
2000	2015	mtwhf	UK, Bible Voice Broadcasting	11830af			
2000	2027		Czech Rep, Radio Prague	5930eu	11600na		
2000	2028		Iran, VOIRI/ IRIB 5940eu	6205eu	7205eu		
			9800af	9925af			
2000	2030	mtwhfa	Albania, Radio Tirana	7465eu	13640na		
2000	2030		Egypt, Radio Cairo	11510af			
2000	2030	Sat	Germany, Pan American BC	9515va			
2000	2030		South Africa, RTE Radio One	6225af			
2000	2030		USA, Voice of America	4930af	4940af		
			6080af	9885af	15580af	17895af	
2000	2030		Vatican City, Vatican Radio	7365af	9755af		
			11625af				
2000	2030	DRM	Vatican City, Vatican Radio	9800na			
2000	2045		USA, WYFR/Family Radio Worldwide	17750sa			
2000	2050		New Zealand, Radio NZ International	11725pa			
2000	2050	DRM	New Zealand, Radio NZ International	9890pa			
2000	2057		Netherlands, R Netherlands Worldwide	5905af			
			7425af	11610af			
2000	2100		Anguilla, Worldwide Univ Network	11775am			
2000	2100		Australia, ABC NT Alice Springs	2310do			
			4835do				
2000	2100		Australia, ABC NT Katherine	2485do			
2000	2100		Australia, ABC NT Tennant Creek	2325do			
2000	2100	Sat/Sun	Australia, Radio Australia	6080va	7240va		
			12080as				
2000	2100		Australia, Radio Australia	9500va	11650as		
			11660pa	11880as			
2000	2100		Belarus, Radio Belarus Minsk	7210eu	7255eu		
			7390eu				
2000	2100		Canada, CFRX Toronto ON	6070na			
2000	2100		Canada, CFVP Calgary AB	6030na			
2000	2100		Canada, CKZN St John's NF	6160na			
2000	2100		Canada, CKZU Vancouver BC	6160na			
2000	2100		Canada, R Canada International	15235va			
			17735va				
2000	2100		China, China Radio International	5960eu			
			5985af	7275va	7285eu	7415eu	
			9600eu	11640af	13630af		
2000	2100		Equatorial Guinea, Radio Africa	15190af			
2000	2100		Germany, CVC Intl-Christian Vision	17770af			
2000	2100		Germany, Deutsche Welle	6150af	11795af		
			11865af	13650af			
2000	2100		Kuwait, Radio Kuwait	11990va			
2000	2100	vl	Liberia, ELWA 4760do				
2000	2100		Malaysia, RTM/Traxx FM	7295do			
2000	2100		Nigeria, Radio Nigeria/Kaduna	4770do			
2000	2100		Nigeria, Voice of Nigeria/Lagos	15120af			
2000	2100		Palau, T8WH/World Harvest	9965as			
2000	2100	vl	Papua New Guinea, R East New Britain	3385do			
2000	2100	vl	Papua New Guinea, Wantok R. Light	7325do			
2000	2100		Russia, Voice of Russia	12040af	12070af		
2000	2100	vl	Rwanda, Radio Rwanda	6055do			
2000	2100		Swaziland, TWR 3200af	9500af			
2000	2100	vl	Uganda, UBC Radio	4976do			
2000	2100		UK, BBC World Service	3255af	3995eu		
			5875eu	6005af	6190af	9410af	
			11810af	12095af	13820af	15400af	
2000	2100	DRM	UK, BBC World Service	3995eu	5875eu		
2000	2100		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
2000	2100		USA, EWTN Vandiver AL	15610me			
2000	2100	smtwhf	USA, WBCQ Monticello ME	7415am			
2000	2100		USA, WBOH Newport NC	5920am			
2000	2100		USA, WHRA Greenbush ME	15665af			
2000	2100	mtwhf	USA, WHRI Cypress Creek SC	7520va			
2000	2100	Sat	USA, WHRI Cypress Creek SC	15665na			
2000	2100	Sun	USA, WHRI Cypress Creek SC	9495va			
2000	2100		USA, WHRI Cypress Creek SC	11785va			
			15665na				
2000	2100		USA, WINB Red Lion PA	13570am			
2000	2100		USA, WRMI Miami FL	9955ca			
2000	2100		USA, WTJC Newport NC	9370na			
2000	2100		USA, WWCR Nashville TN	9980na	12160na		

			13845na	15825na			
2000	2100		USA, WWRB Manchester TN	9385va			
2000	2100		USA, WYFR/Family Radio Worldwide	13615am			
			17725sa	17795na	17845af	18980eu	
2000	2100	vl	Zambia CVC/ The Voice Africa	4965af			
			5940af				
2030	2045		Thailand, Radio Thailand World Svc	9680eu			
2030	2056		Romania, R Romania International	9690na			
			9765eu	11810eu	11940af		
2030	2058		Vietnam, Voice of Vietnam	7220va	7280va		
			9550va	9730va			
2030	2100		Cuba, Radio Havana Cuba	11760va	17660va		
2030	2100		Sweden, Radio Sweden	7395va			
2030	2100		Turkey, Voice of Turkey	7205va			
2030	2100		USA, Voice of America	4930af	4940af		
			6080af	7555me	9885af	15580af	
			17895af				
2045	2100		India, All India Radio	7410eu	9445eu		
			9910pa	9950eu	11620va	11715pa	
2051	2100		New Zealand, Radio NZ International	13730pa			
2051	2200	DRM	New Zealand, Radio NZ International	15720pa			

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100	2125		Turkey, Voice of Turkey	7205va			
2100	2128		Serbia, International Radio of Serbia	6100eu			
2100	2130		Australia, ABC NT Katherine	2485do			
2100	2130		Australia, ABC NT Tennant Creek	2325do			
2100	2130		Austria, AWR-Europe	11955af			
2100	2130	Sat	Canada, CBC NQ SW Service	9625na			
2100	2130		China, China Radio International	6135eu			
			7225eu	7415eu	9490eu	9600eu	
			11640af	13630af			
2100	2130		Cuba, Radio Havana Cuba	17600va	17660va		
2100	2130		Nigeria, Radio, National Svc/Abuja	7275do			
2100	2130		South Korea, KBS World Radio	3955eu			
2100	2145		USA, WYFR/Family Radio Worldwide	13615am			
			13690na	17795na	18980af		
2100	2157		North Korea, Voice of Korea	13760eu	15245eu		
2100	2200		Angola, Radio Nacional de Angola	7217do			
2100	2200		Anguilla, Worldwide Univ Network	11775am			
2100	2200		Australia, ABC NT Alice Springs	2310do			
			4835do				
2100	2200		Australia, Radio Australia	9500as	9660as		
			11650pa	11660pa	11695as	12080as	
			13630as	15515as			
2100	2200		Belarus, Radio Belarus Minsk	7210eu	7255eu		
			7390eu				
2100	2200		Bulgaria, Radio Bulgaria	5900eu	7400eu		
2100	2200		Canada, CFRX Toronto ON	6070na			
2100	2200		Canada, CFVP Calgary AB	6030na			
2100	2200		Canada, CKZN St John's NF	6160na			
2100	2200		Canada, CKZU Vancouver BC	6160na			
2100	2200	DRM	Canada, R Canada International	9800na			
2100	2200		China, China Radio International	5990eu			
			7205af	7285eu	7325af		
2100	2200		Equatorial Guinea, Radio Africa	15190af			
2100	2200		Germany, Deutsche Welle	9735af	11865af		
			15205af				
2100	2200		Germany, Overcomer Ministries	6175eu			
2100	2200		Guyana, Voice of Guyana	3291do			
2100	2200		India, All India Radio	7410eu	9445eu		
			9910pa	9950eu	11620va	11715pa	
2100	2200	vl	Liberia, ELWA	4760do			
2100	2200		Malaysia, RTM/Traxx FM	7295do			
2100	2200		New Zealand, Radio NZ International	13730pa			
2100	2200		Nigeria, Radio Nigeria/Kaduna	4770do			
2100	2200		Nigeria, Voice of Nigeria/Lagos	7255af			
2100	2200		Palau, T8WH/World Harvest	9965as			
2100	2200	vl	Papua New Guinea, Wantok R. Light	7325do			
2100	2200		Russia, Voice of Russia	12040af	12070af		
2100	2200	Sat/Sun	Spain, Radio Exterior Espana	9650eu			
2100	2200		Swaziland, TWR	3200af			
2100	2200		Syria, Radio Damascus	9330eu	12085as		
2100	2200		UK, BBC World Service	3255af	3915as		
			5790eu	5905as	5965as	6005af	
			6190af	6195as	7410af	9915af	
			12095af				
2100	2200	DRM	UK, BBC World Service	3995eu	5790eu		
2100	2200		Ukraine, R Ukraine International	7510eu			
2100	2200		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
2100	2200		USA, EWTN Vandiver AL	15610me			
2100	2200		USA, Voice of America	6080af	7555as		
			15580af				
2100	2200		USA, WBCQ Monticello ME	7415am			
2100	2200		USA, WBOH Newport NC	5920am			
2100	2200		USA, WHRA Greenbush ME	11885af			
2100	2200		USA, WHRI Cypress Creek SC	11785va			
			11885na				
2100	2200	mtwhfa	USA, WHRI Cypress Creek SC	15665na			
2100	2200	Sun	USA, WHRI Cypress Creek SC	9690na			
2100	2200		USA, WINB Red Lion PA	9265am			
2100	2200		USA, WRMI Miami FL	9955ca			
2100	2200		USA, WTJC Newport NC	9370na			
2100	2200		USA, WWCR Nashville TN	7465na	9980na		
			12160na	13845na			
2100	2200		USA, WWRB Manchester TN	9385va			
2100	2200		USA, WYFR/Family Radio Worldwide	7430eu			
			17845na				
2100	2200	vl	Zambia CVC/ The Voice Africa	4965af			
			5940af				
2115	2200		Egypt, Radio Cairo	6255eu			
2130	2157		Czech Rep, Radio Prague	9410na	11600na		
2130	2200		Australia, ABC NT Katherine	5025do			
2130	2200		Australia, ABC NT Tennant Creek	4910do			
2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na			
2130	2200		China, China Radio International	6135eu			
			7225eu	7325eu	7365eu	7415eu	
			9600eu				
2130	2200		Guam, KSDA/ AWR	11850as			
2130	2200		Sweden, Radio Sweden	7395va			
2130	2228		Lithuania, Mighty KBC Radio	6055eu			

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2220		Japan, NHK World Radio Japan	13640pa			
2200	2230		Australia, HCJB Global	15525as			
2200	2230		India, All India Radio	7410eu	9445eu		
			9910pa	9950eu	11620va	11715pa	
2200	2230		Swaziland, TWR	3200af			
2200	2235	DRM	New Zealand, Radio NZ International	15720pa			
2200	2235		New Zealand, Radio NZ International	13730pa			
2200	2245		Egypt, Radio Cairo	6255eu			
2200	2245		USA, WYFR/Family Radio Worldwide	15770af			
			17845va				
2200	2255		Turkey, Voice of Turkey	9830va			
2200	2256		Romania, R Romania International	7440eu			
			9675eu	9790af	11940af		
2200	2300		Anguilla, Worldwide Univ Network	6090am			
2200	2300		Australia, ABC NT Alice Springs	2310do			
			4835do				
2200	2300		Australia, ABC NT Katherine	5025do			
2200	2300		Australia, ABC NT Tennant Creek	4910do			
2200	2300		Australia, Radio Australia	12010va	13630pa		
			15230va	15240pa	15515as	15560pa	
			17795va				
2200	2300		Belarus, Radio Belarus Minsk	7210eu	7255eu		
			7390eu				
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na			
2200	2300		Canada, CFRX Toronto ON	6070na			
2200	2300		Canada, CFVP Calgary AB	6030na			
2200	2300		Canada, CKZN St John's NF	6160na			
2200	2300		Canada, CKZU Vancouver BC	6160na			
2200	2300		China, China Radio International	7350eu			
			7360eu	9590as			
2200	2300		Equatorial Guinea, Radio Africa	15190af			
2200	2300		Guyana, Voice of Guyana	3291do			
2200	2300	vl	Liberia, ELWA	4760do			
2200	2300		Malaysia, RTM/Traxx FM	7295do			
2200	2300		Nigeria, Radio Nigeria/Kaduna	4770do			
2200	2300		Nigeria, Voice of Nigeria/Lagos	7255af			
2200	2300		Palau, T8WH/World Harvest	9965as			
2200	2300	vl	Papua New Guinea, Wantok R. Light	7325do			
2200	2300		Russia, Voice of Russia	9890na	12040af		
			12070af				
2200	2300		UK, BBC World Service	3915as	5905as		
			5965as	6005af	6195as	9440as	
			9740as	9915af	12095af		
2200	2300		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7811usb	
			10320usb	12133usb	13362usb		
2200	2300		USA, EWTN Vandiver AL	15610me			
2200	2300		USA, Voice of America	5895va	5915va		
			7460va	7480va	7555as	9415va	
			11955va				
2200	2300		USA, WBCQ Monticello ME	5110am	7415am		
2200	2300		USA, WBOH Newport NC	5920am			
2200	2300		USA, WHRI Cypress Creek SC	11785va			
			11885na				
2200	2300		USA, WINB Red Lion PA	9265am			
2200	2300		USA, WRMI Miami FL	9955ca			
2200	2300		USA, WTJC Newport NC	9370na			
2200	2300		USA, WWCR Nashville TN	5070na	7465na		

			9980na	13845na		
2200	2300		USA, WWRB Manchester TN		5050va	6890va
			9385va			
2200	2300		USA, WYFR/Family Radio Worldwide			5950na
			11740af	15440na		
2200	2300	vl	Zambia CVC/ The Voice Africa			4965af
2215	2300	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie			6240na
2230	2257		Czech Rep, Radio Prague		7345na	9415na
2230	2300		Guam, KSDA/ AWR		15320as	
2230	2300		USA, Voice of America		9570va	11705va
			15145va			
2236	2300	DRM	New Zealand, Radio NZ International			13730pa
2245	2300		India, All India Radio		9705eu	9950as
			11620as	11645as	13605as	

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000		Anguilla, Worldwide Univ Network			6090am
2300	0000		Australia, ABC NT Alice Springs			2310do
			4835do			
2300	0000		Australia, ABC NT Katherine		5025do	
2300	0000		Australia, ABC NT Tennant Creek			4910do
2300	0000		Bulgaria, Radio Bulgaria		9700na	11700na
2300	0000	smtwhf	Canada, CBC NQ SW Service		9625na	
2300	0000		Canada, CFRX Toronto ON		6070na	
2300	0000		Canada, CFVP Calgary AB		6030na	
2300	0000		Canada, CKZN St John's NF		6160na	
2300	0000		Canada, CKZU Vancouver BC		6160na	
2300	0000		China, China Radio International			5915as
			5990na	6145na	7410na	9610as
			11690as	11790as	11840na	
2300	0000		Cuba, Radio Havana Cuba		13790sa	
2300	0000		Egypt, Radio Cairo		11590na	
2300	0000		Guyana, Voice of Guyana		3291do	
2300	0000		India, All India Radio		9705eu	9950as
			11620as	11645as	13605as	
2300	0000		Malaysia, RTM/Traxx FM		7295do	
2300	0000		New Zealand, Radio NZ International			15720pa
2300	0000	DRM	New Zealand, Radio NZ International			13730pa
2300	0000	vl	Papua New Guinea, Wantok R. Light			7325do
2300	0000		Russia, Voice of Russia		9665sa	9890na
2300	0000		UK, BBC World Service		3915as	5965as
			6195as	9580as	9740as	9885as
			11850as	12010as		
2300	0000		USA, American Forces Network			4319usb
			5446usb	5765usb	6350usb	7811usb
			10320usb	12133usb	13362usb	
2300	0000		USA, EWTN Vandiver AL		15610me	
2300	0000		USA, Voice of America		5895va	5915va
			7480va	7555as	9415va	11955va
2300	0000		USA, WBCQ Monticello ME		5110am	7415am
2300	0000		USA, WBOH Newport NC		5920am	
2300	0000		USA, WHRA Greenbush ME		9615eu	
2300	0000		USA, WHRI Cypress Creek SC			7315va
			5875na	9615na	11785va	
2300	0000	Sat/Sun	USA, WHRI Cypress Creek SC			9615na
2300	0000		USA, WINB Red Lion PA		9265am	
2300	0000		USA, WRMI Miami FL		9955ca	
2300	0000		USA, WTJC Newport NC		9370na	
2300	0000		USA, WWCR Nashville TN		5070na	7465na
			9980na	13845na		
2300	0000		USA, WWRB Manchester TN		5050va	6890va
			9385va			
2300	0000		USA, WYFR/Family Radio Worldwide			5950na
			11580na	15255as	15400na	17750eu
2300	0000		Zambia CVC/ The Voice Africa			4965af
2300	2305	vl	Liberia, ELWA	4760do		
2300	2315		Nigeria, Radio Nigeria/Kaduna			4770do
2300	2330		Australia, Radio Australia		9660as	12010pa
			12080pa	13690pa	15230va	15240pa
			15560va	17795va		
2300	2330		Palau, T8WH/World Harvest		15550as	
2300	2330		USA, Voice of America		9570va	13755va
			15145va			
2300	2345		USA, WYFR/Family Radio Worldwide			11740am
2300	2345	DRM	Vatican City, Vatican Radio		9755na	
2305	0000		Canada, R Canada International			6100am
2315	2330		Croatia, Voice of Croatia		3985eu	7375sa
2315	2330	mtwhf	Moldova, Radio PMR/Pridnestrovie			6240na
2330	0000		Australia, Radio Australia		9660as	12010as
			12080as	13690as	15230va	15415as
			15560va	17750va	17795va	
2330	0000		USA, Voice of America		7460va	9570va
			13755va	15145va	15340va	
2330	2358		Vietnam, Voice of Vietnam		9840as	12020as

MT ENGLISH LANGUAGE SHORTWAVE STATION RESOURCE GUIDE

Albania, Radio Tirana	http://rtsh.sil.at/
Angola, Radio Nacional de Angola	www.rna.ao/
Anguilla, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Argentina, RAE	www.radionacional.gov.ar/rae/rae.asp
Australia, ABC NT Alice Springs	www.abc.net.au/radio/
Australia, ABC NT Katherine	www.abc.net.au/radio/
Australia, ABC NT Tennant Creek	www.abc.net.au/radio/
Australia, CVC International	www.christianvision.com/
Australia, HCJB Global	www.hcjb.org/
Australia, Radio Australia	www.abc.net.au/ra/
Austria, AWR Europe	www.awr2.org/
Austria, Radio Austria Intl	http://oe1.orf.at/service/international
Bahrain, Radio Bahrain	www.radiobahrain.net/
Bangladesh, Bangla Betar	www.betar.org.bd/
Belarus, Radio	www.radiobelarus.tvr.by/eng/
Bhutan, BBS	www.bbs.com.bt/
Bulgaria, Radio	www.bnr.bg/
Canada, CBC NQ SW Service	www.cbc.ca/north/
Canada, Radio Canada Intl	www.rcinet.ca/
China, China Radio Intl	www.cri.cn/
Costa Rica, Worldwide Univ Network	www.worldwideuniversitynetwork.com/
Croatia, Croatian Radio	www.hrt.hr/
Cuba, Radio Havana	www.radiohc.cu/
Czech Rep, Radio Prague	www.radio.cz/en/
Finland, Overcomer Ministries	www.overcomerministries.org
France, Radio France Intl	http://rfienglish.com
Germany, AWR Europe	www.awr2.org/
Germany, CVC Intl/Voice Africa	www.christianvision.com/
Germany, Deutsche Welle	www.dw-world.de/
Germany, Overcomer Ministries	www.overcomerministry.org/
Germany, Pan American BC	www.radiopanam.com/
Germany, The Overcomer Ministries	www.overcomerministry.org/
Germany, TWR Europe	www.twr.org/
Greece, Voice of Greece	www.voiceofgreece.gr/
Guam, AWR/KSDA	www.awr2.org/
Guam, TWR/KTWR	www.twr.org/
Guyana, Voice of	http://voiceofguyana.com/
India, All India Radio	www.allindiaradio.org/
Indonesia, Voice of Indonesia	www.rri-online.com/
Iran, Voice of the Islamic Rep of Iran	www2.irib.ir/worldservice/
Italy, IRRS	www.nexus.org
Japan, NHK World/Radio Japan	www.nhk.or.jp/english/
Jordan, Radio	www.jrtv.jo/rj/index.php
Latvia, Radio SWH	www.radioswh.lv/index.php
Liberia, ELWA	www.elwaministries.org/
Libya, Voice of Africa	www.ljbc.net/home.php
Lithuania, Radio Vilnius	www.lrt.lt/
Malaysia, RTM/Traxx FM	www.traxxfm.net/index.php
Malaysia, RTM/Voice of Malaysia	http://202.190.233.9/vom/utama.htm
Monaco, TWR Europe	www.twr.org/
Nepal, Radio Nepal	www.radionepal.org/
Netherlands, Radio Netherlands	www.radionetherlands.nl/
New Zealand, Radio NZ Intl	www.rnzi.com
Nigeria, Radio, Natl Svc/Abuja	http://radionigeriaonline.com
Nigeria, Radio/Kaduna	http://radionigeriaonline.com
Nigeria, Voice of/ Ext. Svc Lagos	www.voiceofnigeria.org
Oman, Radio Oman	www.oman-tv.gov.om
Pakistan, Radio	www.radio.gov.pk
Papua New Guinea, NBC	www.nbc.com.pg/
Papua New Guinea, Wantok R. Light	http://wantokradio.net/
Philippines, Radio Pilipinas	www.radiopilipinas.com/
Poland, Polish Radio	www.polskieradio.pl/zagranica/gb/
Romania, Radio Romania Intl	www.rri.ro/
Russia, Voice of Russia	www.vor.ru/world.html
Saudi Arabia, BSKSA	www.saudiradio.net/
Slovakia, Radio Slovakia Int	www.rsi.sk
Solomon Islands, SIBC	www.sibconline.com.sb/
South Africa, AWR Africa	www.awr2.org/
South Africa, Channel Africa	www.channelafrica.org
South Africa, Trans World Radio	www.twr.org/
South Korea, KBS World Radio	http://rki.kbs.co.kr/english/
Spain, Radio Exterior Espana	www.ree.rne.es/
Sri Lanka, SLBC	www.slbc.lk
Swaziland, Trans World Radio	www.twr.org/
Sweden, Radio	www.sr.se/rs/english/
Syria, Radio Damascus	www.rtv.gov.sy/
Taiwan, Radio Taiwan Intl	http://english.rti.org.tw/
Thailand, Radio	www.hsk9.com/
Turkey, Voice of	www.trt,net.tr
UK, BBC World Service	www.bbc.co.uk/worldservice/
UK, Bible Voice BC	www.biblevoice.org/
UK, FEBA	www.feba.org.uk
UK, Sudan Radio Service	www.sudanradio.org/
Ukraine, Radio Ukraine Intl	www.nrcu.gov.ua/
USA, American Forces Radio	http://myafn.dodmedia.osd.mil/
USA, KNLS Anchor Point AK	www.knls.org/
USA, KTBN Salt Lake City UT	www.tbn.org/
USA, KWHR Naalehu HI	www.whr.org/
USA, Voice of America	www.voanews.com/
USA, WBCQ Monticello ME	www.wbcq.com/
USA, WBOH Newport NC	www.fbnradio.com/
USA, WEWN Vandiver AL	www.ewtn.com
USA, WHRA Greenbush ME	www.whr.org/
USA, WHRI Cypress Creek SC	www.whr.org/
USA, WINB Red Lion PA	www.winb.com/
USA, WRMI Miami FL	www.wrmi.net/
USA, WRNO New Orleans LA	www.wrnoworldwide.org/
USA, WTJC Newport NC	www.fbnradio.com/
USA, WWCR Nashville TN	www.wwcr.com
USA, WWRB Manchester TN	www.wwrb.org/
USA, WYFR/Family Radio Worldwide	www.worldwide.familyradio.org
Uzbekistan, CVC International	www.christianvision.com/
Vatican City, Vatican Radio	www.vaticanradio.org
Vietnam, Voice of Vietnam	www.vov.org.vn
Yemen, Rep of Yemen Radio	www.yemenradio.net
Zambia, CVC Intl/Christian Voice	www.christianvision.com/

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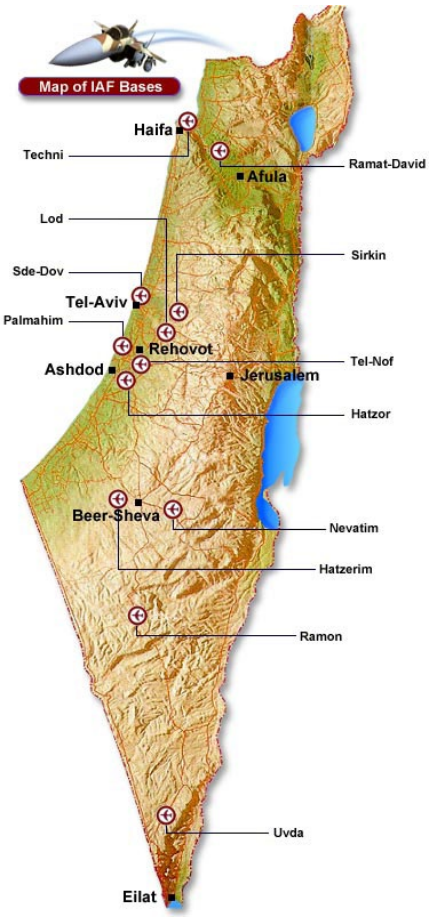
Monitoring the Israeli Military

Tensions in the Middle East continue to rise and the focus of the tension is on the country of Israel. If hostilities do break out, radio monitors may be able to monitor some interesting communications on the various Israeli Defense Forces HF radio networks.

The Israel Defense Forces (IDF), commonly known in Israel by the Hebrew acronym Tzahal, are Israel's military forces, comprising the ground forces, air force and navy. It is the sole military wing of the Israeli security forces, and has no civilian jurisdiction within Israel. The IDF is headed by its Chief of General Staff, the Ramatkal, subordinate to the Defense Minister of Israel.

At the order of Defense Minister David Ben-Gurion on May 26, 1948, the Israel Defense Forces were officially formed as a conscript army out of the paramilitary group Haganah, incorporating the militant groups Irgun and Lehi. It has served as Israel's armed forces in all the country's wars – the 1948 Arab-Israeli War, the 1956 Sinai War, the 1967 Six-Day War, the War of Attrition, the 1973 Yom Kippur War, the 1982 Lebanon War, and the 2006 Lebanon War.

While originally the IDF was operational on three fronts – against Lebanon and Syria in the north, Jordan and Iraq in the east, and Egypt in the south – after the 1979 Egyptian-Israeli Peace Treaty, its activities have mainly been concentrated in southern Lebanon and the Palestinian Territories, including the First and Second Intifada.



The Israel Defense Forces differs from most armed forces in the world in many ways – including the conscription of women and its structure, especially the close relations between the ground forces, air force and navy. Since its founding, the IDF has striven to be a unique army fitting Israel's specific requirements.

The IDF uses several technologies developed in Israel, many of them made specifically to match the IDF's needs, such as the Merkava main battle tank, advanced Hi-Tech weapons systems, Uzi submachine gun, the Desert Eagle and the Galil and Tavor assault rifles. It also has close military relations with the United States, including cooperation in development, such as on the F-15I jet, THEL laser defense system, and the Arrow missile defense system.

In this edition of *Milcom*, I will discuss two of the country's military forces – the Air Force and Navy.

❖ Israeli Air Force

The Israeli Air Force, (the IAF, commonly known as Hel HaAvir, "Air Corps") is the air force of the Israel Defense Forces. The Israeli Air Force has approximately 1000 aircraft. The IAF has maintained total air superiority in the region since its creation.

Over the last few years, radio monitors have uncovered an HF ALE network associated with the IAF. Below is a profile of what is currently known about this extensive network and the stations that have been observed on it. Table Two is the best information we have on the IAF Order of Battle that can be used to identify any ALE addresses decoded on the IAF HF ALE network.

Table One: RIAF Frequencies

IAF Frequencies monitored in the last three years
(Freqs in kHz, Modes USB/ALE)

3823.0 3824.0 3865.0 3870.0 4507.0 4681.0 4952.0 5048.5 5123.0 5129.0 5133.0 5209.0 5269.0 5329.0 5478.0 5581.0 5852.0 6224.0 6265.0 6288.0 6372.0 6487.0 6631.0 6736.0 6742.0 6748.0 6878.0 6898.0 6921.0 6925.0 6992.0 7476.0 7641.5 7655.0 7848.0 7950.0 7957.0 7961.0 7965.0 7967.0 8000.0 8035.0 8135.0 8165.5 8234.0 8262.0 8300.0 8323.0 8521.0 8541.0 8556.0 8622.0 8858.0 9135.0 9137.0 9219.0 10004.0 10139.0 10352.0 10642.0 11246.0 11456.0 13291.0 19602.0

Previously Monitored IAF Frequencies

4410.0 4700.0 4795.0 5395.0 5400.0 5418.0 5456.0 5470.0 5480.0 5500.0 5762.0 5813.0 5930.0 6840.0 6864.0 7370.0 7460.0 7630.0 7734.0 7778.0 7780.0 8100.0 8125.0 8162.0 8365.0 9227.0 10614.0 10900.0 11349.0 11491.0 12143.0 12251.0 13072.0 14453.0 19326.0

IAF ALE ADDRESSES

Unknown Unit/Location

AA2 AA3 AA4 AA5 AA6 AA7 AA8 AMM BB4 BB7 BAA DD3 DD7 DD8 DDD KH1 KN1 NAK NT1 NT2 SA3 TKM TS1 TS2 TS3 TSM TSR XT9 XXX YN1 YN2 ZM6

Unknown Aircraft/Unit/Location

B19 B36 B84 C52 C54 O13 R10 R17 R27 R67 S15 S19 S30 S45 S53 T22 T26 W69

AA1	103 Squadron	Nevatim AB	
AAA	Air Force Headquarters	Tel Aviv	
ACC	Air Force Headquarters	Tel Aviv	
ACCES1	Air Force Headquarters	Tel Aviv	
AE2	Air Force Headquarters	Tel Aviv	
AS5	Air Force Headquarters	Tel Aviv	
BB1	124 Squadron	Palachim AB	
BB2	160 Squadron	Palachim AB	
BB3	161 Squadron	Ovda AB	
BB5	Unknown unit	Palachim AB	
C14	160 Squadron	Palachim AB	AH-1F Tsefa C #514
C21	160 Squadron	Palachim AB	AH-1S Tsefa A #521
C46	FTS	Hatzerim AB	Tzukit #546
C62	123 Squadron	Hatzerim AB	S-70A Yanshuf #562: Desert callsign
C83	FTS	Hatzerim AB, Israel	Tzukit #683, might also be helo 483/383
DD1	103 Squadron	Nevatim AB	
DD2	131 Squadron	Nevatim AB	
GB2	131 Squadron	Nevatim AB	
GT4	131 Squadron	Nevatim AB	
GT6	131 Squadron	Nevatim AB	
K27	103/131 Squadron	Nevatim AB	C-130H Kamaf #427: 4X-FBS
K35	103/131 Squadron	Nevatim AB	C-130H Kamaf #435, 4X-FBT
K45	103/131 Squadron	Nevatim AB	C-130H Kamaf #545, 4X-FBZ
M46	120 Squadron	Nevatim AB	Boeing B-707 (Phalcon) #246: 4X-JYS
M60	120 Squadron	Nevatim AB	Boeing B-707 (EC-707) #260: 4X-JYN
M64	120 Squadron	Nevatim AB	Boeing B-707 (EC-707) #264: 4X-JYH

M72	120 Squadron	Nevatim AB	Boeing B-707 (EC-707) #272: 4X-JYV
M75	120 Squadron	Nevatim AB	Boeing B-707 (EC-707) #275: 4X-JYN
MN1	Unknown Unit/Location	Manat=Test & Evaluation	
RAM	Unknown unit	Ramat David AB, Israel	
TYS	Unknown Unit/Location	Tayesat=Squadron	

Table 2: Israeli Air Force Order of Battle

Ramat David Airbase, ICAO Airport Code: LLRD (1st Air-Wing)
109th Squadron (The Valley Squadron) – F-16D Block 30
110th Squadron (Knights of the North Squadron) – F-16C Block 30
117th Squadron (The First Jet Squadron) – F-16C Block 30
193rd Squadron (The Defenders of the West Squadron) – Eurocopter Panther (Joint Command with the navy)

Sdot Micha (2nd Air-Wing)
150th Squadron of IRBM missiles
199th Squadron of IRBM missiles
248th Squadron of IRBM missiles

Hatzor Airbase, ICAO Airport Code: LLHS (4th Air-Wing)
101st Squadron (The First Fighter Squadron) – F-16C Block 40
105th Squadron (The Scorpion Squadron) – F-16D Block 40

Hatzerim Airbase, ICAO Airport Code: LLHB (6th Airbase)
69th Squadron (The Hammers Squadron) – F-15I
102nd Squadron (The Flying Tiger Squadron) – TA/A-4N and various trainer aircraft (Flight Training School)
107th Squadron (Knights of the Orange Tail Squadron) – F-16I
123rd Squadron (The Southern Bells Squadron) – S-70A
Aerobatics Team operating AMIT Fouga Magister

Tel Nof Airbase, ICAO Airport Code: LLEK (8th Airbase)
106th Squadron (The Edge of the Spear Squadron) – F-15B/C/D
114th Squadron (The Night Leaders Squadron) – CH-53-2000
118th Squadron (The Nocturnal Birds of Prey Squadron) – CH-53-2000
133rd Squadron (Knights of the Twin Tail Squadron) – F-15A/B/D
601st Squadron (Flight Testing Center Squadron) – F-15I and F-16A/B/C/D

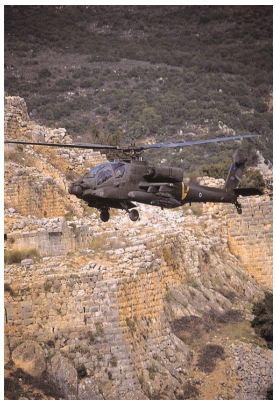
Ovda Airbase, ICAO Airport Code: LLOV (10th Airbase)
115th Squadron (The Flying Dragon Squadron) – F-16A/B Opposing forces emulation squadron
161st Squadron (The Northern Cobra Squadron) – AH-1E/F
Aviation and IAF Officers School

Sde Dov Airbase, ICAO Airport Code: LLSD (15th Air-Wing)
100th Squadron (The Flying Camel Squadron) – Beechcraft 200 King Air
135th Squadron (The Air Kings Squadron) – Beechcraft 200 King Air and Beechcraft Bonanza

Haifa Airbase (21st Airbase)
Technical School and IAF Technological College

Ramon Airbase, ICAO Airport Code: LLRM (25th Air-Wing)
113th Squadron (The Hornet Squadron) – AH-64D
119th Squadron (The Bat Squadron) – F-16I
190th Squadron (The Magic Touch Squadron) – AH-64
201st Squadron (The One Squadron) – F-16I
253rd Squadron (The "Negev" Squadron) – F-16I

Nevatim Airbase, ICAO Airport Code: LLNV (28th Airbase)
103rd Squadron (The Elephants Squadron) – C-130
116th Squadron (Defenders of the South Squadron) – F-16A/B
120th Squadron (The International Squadron) – Boeing 707
122nd Squadron (The Dakota Squadron) – Gulfstream G550
131st Squadron (The Yellow Bird Squadron) – C-130
140th Squadron (The Golden Eagle Squadron) – F-16A/B



AH-64 Apache gunship is a workhorse in Israel's counter-insurgency operations. Credit: Israeli Air Force

Palmachim Airbase (30th Airbase)
124th Squadron (The Rolling Sword Squadron) – UH-60A/S-70A
151st Squadron (Missile Testing Squadron)
160th Squadron (The Southern Cobra Squadron) – AH-1E/F
200th Squadron (1st UAV Squadron) – Heron UAVs
166th Squadron (2nd UAV Squadron) – Hermes 450 UAVs

Machanaim Reserve Airbase (Reserve Squadrons)
125th Squadron (The Light Choppers Squadron) – Former operator of Bell-206
144th Squadron (The Phoenix Squadron) – Former operator of F-16A/B
147th Squadron (The Goring Ram Squadron) – Former operator of A-4
149th Squadron (The Smashing Parrot Squadron) – Former operator of Kfir
192nd Squadron (The Hawk Eye Squadron) – Former operator of E-2
254th Squadron (The Midland Squadron) – Former operator of Kfir

IAF Aircraft

Israeli Description	English Translation	International Description
Aitam	Fish Eagle	Gulfstream G550 AEW version
Atalef	Bat Eurocopter	AS565 Panther
Ayit	Eagle	McDonnell Douglas A-4 Skyhawk
Barak	Lightning	Lockheed F-16C/D Fighting Falcon
Baz	Falcon	McDonnell Douglas F-15 Eagle
Chofit	Stint	Beech A36 Bonanza
Karnaf	Rhinoceros	Lockheed C-130 Hercules
Nachshon	Pioneer	Gulfstream G550
Netz	Hawk	Lockheed F-16A/B Fighting Falcon
Ra'am	Thunder	Boeing F-15I
Re'em	Oryx	Boeing 707
Saifan	Avocet	Bell 206 Jet Ranger
Saifanit	Gladiolus	Bell 206L Long Ranger
Saraf	Serpent	Boeing AH-64A Apache
Shahaf	Seagull	IAI Seascan
Shavit	Comet	Gulfstream G550 SIGINT version
Soufa	Storm	Lockheed F-16I Fighting Falcon
Tzefa	Viper	Bell AH-1 Huey Cobra
Tzufit	Honeydew	Beechcraft B200 King Air
Tzukit	Cliff IAI	Tzukit
Yanshuf	Owl	Sikorsky UH-60 Black Hawk
Yas'ur	Petre	Sikorsky CH-53

❖ Israeli Navy

The Israeli Navy (Hebrew: Heil HaYam HaYisraeli, "Israeli Sea Corps") is the naval arm of the Israel Defense Forces, operating primarily in the Mediterranean Sea in the west and in the Gulf of Eilat, Red Sea, and Gulf of Suez in the south. The most common face of the Israeli Navy is their communications station located at Haifa, Israel (callsign 4XZ).

This station has been active in the HF utility bands for years using Morse code. In recent years the familiar 4XZ CW marker (Enigma identifier M22) has pretty much given way to a new mode – ISR-N-HYBRID (2400 baud serial modem).

Due to encryption, not much is known about the traffic sent on Israeli Navy frequencies. Below are the Israeli Navy data frequencies that have been monitored in the last three years since they were first reported in the utility monitoring community.

Recently Monitored Frequencies

(in kHz, mode ISR-N-HYBRID):
2803.0 2860.0 3162.0 3815.0 4080.0 4136.0 4241.0 4451.0 4495.0 4520.0 5000.0 5146.0 5207.0 5233.0 5348.0 5395.0 5512.0 5669.0 6326.0 6525.0 6618.0 6990.0 7170.0 7954.0 8545.0 8780.0 10341.0 12160.0 13966.0 20956.0

You can still hear the V CW marker and five letter traffic from 4XZ on the following frequencies:
2680.0 2800.0 4118.0 4331.0 6379.0 6607.0 6982.0 8924.0

You can learn more about the 4XZ station on Fritz Nusser's website at **www.astrosol.ch/53790397a40a2bb01/53790397a40a31504/index.html.**

Israeli Navy Bases – Units

Haifa base –
Missile Boats Flotilla, the Submarine Flotilla, Patrol Boats Unit 914.
Atlit base – Shayetet 13
Ashdod base – Patrol Boats Unit 916.
Eilat base – Patrol Boats Unit 915.
Haifa –
Naval Training Base: The submarine operations school, the missile boat operations school, and the naval command school are located at the Naval Training Base.
HaKirya, Tel Aviv – Navy Headquarters
Mamtam - IT, processes and computing.

I have some additional information on Israeli military frequencies, including some in the VHF low band on the Milcom Monitoring Post at **http://mt-milcom.blogspot.com/2006/07/monitoring-middle-east-tinder-box_18.html**

If you have any additions, corrections or updates, please send them to the email address in the masthead. Be sure to check our Internet blog at **http://mt-milcom.blogspot.com/** for the latest information on these two military services and their communications.

And that does it for this month. Until next time 73 and good hunting.

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http://americanbandscan.blogspot.com

And now a word from your local station...

When I moved to Tennessee in 1990, the city of Dickson, 30 miles west of Nashville, was served by two co-owned stations: WDKN-AM 1260 and WDKN-FM 102.3. The AM station was limited to daytime-only operation, but the FM station provided nighttime service to Dickson County.

Shortly after I arrived, WDKN-FM was sold. The new owners changed frequency and increased power. While the station was still technically a Dickson station, all programming came from – and was directed to – Nashville. Eventually, even the pretense of service to Dickson was dropped; for clerical reasons, the official community being served was changed to the Nashville suburb of Pegram.

About the same time, a new FM station was licensed in Dickson. This station, WYYB, also provided local nighttime service to Dickson County. Unfortunately, WYYB didn't last very long, either. Soon it, too, was sold to a Nashville broadcaster and put to work filling the gaps in the Nashville coverage of another FM station ostensibly located in a different outlying community. WYYB, too, is no longer licensed to Dickson.

Finally, a third FM station, this one non-commercial, was licensed to Dickson. This station has never made any claim to provide local service; from its first day on the air, WNRZ has relayed a Christian rock station based at a Nashville university.

WRUS-610 Russellville, Kentucky – or at least as much of it as you can see without power lines

So, Dickson (pop. 12,244) is left with one local radio service: a daytime-only AM station. I doubt it's any surprise to most *American Bandscan* readers that daytime-only AM stations are not doing very well. Mix in a messed-up economy, and I would imagine readers will not be surprised to hear WDKN suspended operations in March – leaving Dickson with no local service whatsoever.

And I'm sure most readers can cite at least one other case where a community has lost its local stations to nearby larger cities. The FCC has certainly noticed. Now, they're taking steps to stem this tide. A Notice of Proposed Rulemaking, *Policies to Promote Rural Radio Service and to Streamline Allotment and Assignment Procedures*, has been released. It makes thirteen specific points. The highlights:

Modify the priorities used when assigning new FM channels.

When there are competing proposals to assign new FM channels, priorities are, in order;

1) first station serving an area;
2) second station serving an area;
3) first station licensed to the community;
4) station licensed to the most populous community.

This practice has tended to favor suburbs of large cities. There are few areas in the U.S. that aren't already served by at least two stations. (And such areas are so isolated and lightly populated that nobody is interested in serving them!) Applicants who pick an area they wish to serve can almost always find a community somewhere in that service area that doesn't already have a station licensed to it – the third priority is usually a tie. So, the channel ends up assigned to the most populous community. Which is, more often than not, a suburb of a large city.

The FCC proposes to consider channel assignments that would cover the majority of an urbanized area to be licensed to the central city of that urbanized area. If two proposals existed, one to assign 94.5 to Lobelville, Tennessee (pop. 915) and the other to assign the channel to Bellevue (population hard to estimate but at least 10,000), the channel would go to Lobelville. Bellevue is located such that the 94.5 station there would cover Nashville.

Since Nashville already has plenty of radio stations (?!), 94.5 would not be considered the first station licensed to the community (even though Bellevue has no stations) and the priority would go to Lobelville.

Establish a priority for stations licensed to Native American groups and serving tribal lands.

The proposal is to give a preference, in assignment of channels, to Native American tribes. To qualify, at least half of the city-grade coverage of the proposed station would have to be on tribal lands; the station would have to be the first licensed to the community; and that community itself must be on tribal lands. Any permit won through such a preference would have to be held by eligible tribes for at least four years.

Prohibit the downgrading of an AM facility if a superior coverage proposal was used to win the permit.

When choosing between multiple applicants for mutually-exclusive AM service, the proposal that would serve the greatest population usually wins. Under current rules, once an applicant wins, they can downgrade their proposed facilities. (for example, to use fewer towers and thus greatly reduce real estate costs) The Commission proposes to require those who win an AM permit this way to maintain facilities that reach at least as many people as the original proposal for at least four years.

Limit the number of AM applications a given entity can file in a given window.

In a recent AM auction, 460 applicants filed 1,311 applications. Ten applicants filed more than twenty applications each; one couple, filing under their individual names and the name of a corporation in which they were the only stockholders, filed 85 applications.

The Commission feels many of these applications were filed speculatively; the applicants hoped some of their applications would not have to go to auction, and had no plans to pursue any applications that did require an auction. The Commission proposes to limit speculative applications by limiting a single applicant to five applications in any given filing window.

Prohibit FM translator "band-hopping."

Separate filing windows exist for FM translators in the non-commercial band below 92MHz, and in the commercial band above 92MHz. Translators below 92MHz may receive their primary signal via satellite; that's not permitted for translators in the commercial band.

Applications for "major changes" must

wait for filing windows. A change is not "major" if it involves a change in frequency of 0.6MHz or less, or a move to a frequency separated by 10.6 or 10.8MHz from the original frequency.

In Auction #83 of translator permits above 92MHz, a number of applicants filed for, and received, translator permits for frequencies between 92.1-92.5 or 98.7-102.7. They promptly filed for "minor changes" to move these translators to frequencies below 92MHz – where they could use satellite feeds.

The FCC feels these moves were unfair to applicants who were patiently waiting for an auction of permits below 92MHz. They propose to prohibit an FM translator from changing frequencies across the 92MHz border (either from a frequency above 92MHz to one below, or vice-versa) unless the translator has been on the air for at least two years.

❖ HD Radio notes

Under current rules, the digital power of a HD Radio station is limited to 1% of the station's analog power. Stations have been disappointed with their digital coverage; some experiments have been run with FM-IBOC at 10% of analog power. Last year, the FCC opened an inquiry into the possibility of allowing an across-the-board increase for FM-IBOC stations. NPR replied with some concerns and a promise to present a study this September showing just how much FM-IBOC power can be used without causing interference.

The Commission is asking whether they should defer consideration of the 10% power increase until the NPR study is ready. They're also asking whether standards should be adopted to protect first-adjacent stations from IBOC interference – to date, they've been assuming the first-adjacent protections in the analog rules are adequate to protect against interference from digital signals.

Microsoft has been offering a "Zune," their answer to Apple's popular iPod media player. A new "Zune HD" has been announced; along with music and movies saved to the device's internal storage, it will also contain an HD Radio tuner. (And the ability to play movies in high definition to an external HD television...)

❖ Analog TV: dead, I think.

My deadline for this column is a few days before the scheduled shutdown of full-power analog TV in the United States. There are no proposals to extend this shutdown again; it's looking like it will be for real. The FCC did clarify that the "Analog Nightlight Act" does extend into July. A few analog stations will have been allowed to remain on the air with digital transition information until July 12th. Barring any surprises, all full-power analog TV in the U.S. will be gone by the time you read this.

❖ Canadian notes

The situation in Merritt, British Columbia may seem a bit confusing. If you look in the sidebar, you'll see CJNL-1230 is moving to 101.1 FM – but there's also an application for a new station in Merritt, also on 1230. The proposed new AM station will use the existing CJNL transmitter, but will relay CHNL-610 Kamloops. CJNL's Merritt-based programming will move to the new FM transmitter.

CKRD Red Deer, Alberta operated on 700kHz for some time before moving to FM and changing callsigns. The operators of religious FM station CJSI in Calgary now plan to reactivate the 700kHz frequency. The highly directional nighttime antenna pattern, protecting WLW Cincinnati, will make this station a difficult nighttime catch in the U.S. Midwest and East, though it will likely be well heard in the West. The daytime pattern is much more favorable and the station is likely to be a common catch at sunrise/sunset.

One of Canada's few expanded-band stations wishes to leave the X-band. CJWI-1610 Montreal cites interference from Toronto's CHHA on the same frequency. They propose to move to the 1410 channel abandoned by CFMB when it took over the 1280 frequency from CJMS.

Two applications for new ethnic stations in the Toronto area (960 and 1350kHz) were both denied. The CRTC felt neither station would be economically viable.

Last time, I mentioned three TV stations in Manitoba and Ontario were threatened with closure. Cable operator Shaw has agreed to purchase CKX-TV Brandon, CHWI-TV Windsor, and CKNX-TV Wingham for $1 each. (CKX-TV had been offered to the CBC for $1; the CBC refused...)

❖ 'Til next month

Have any of your local stations moved from a small town to the big city? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to *dougsmith@monitoringtimes.com.* Good DX!

URLS IN THIS MONTH'S COLUMN:

http://americanbandscan.blogspot.com
My DX blog.
http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-09-1127A1.txt
FCC release on FM-IBOC power increase.
http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-09-30A1.pdf
FCC release on broadcast "localism".
www.tradingmarkets.com/.site/news/Stock%20News/2301992/
Shaw Communications agrees to buy three TV stations for $1 each.
http://deane.bio.ucalgary.ca/Calgary700Day.pdf
Daytime pattern of new Calgary station on 700KHz.
http://deane.bio.ucalgary.ca/Calgary700Night.pdf
Nighttime pattern of above station.
www.zune.net/en-us/mp3players/zunehd/default.htm
Microsoft's media player with HD Radio tuner.

AM BANDSCAN STATION REPORT:

NEW:

New stations on the air			
Spanish Valley, Utah	1490	KCPX	1,000/1,000 ND
New station permits granted			
Calgary, Alberta	700		50,000/20,000 DA-2
Merritt, British Columbia	1230		1,000/1,000 ND
Desert Hot Springs, Calif.	1220		1,400/1,200 DA-2
Columbia Falls, Montana	1400		1,000/670 ND
Valencia, New Mexico	1220		400/250 DA-N
Middleton, Tennessee	1580		300/250 DA-N
New station applications denied/dismissed			
Pleasant Hill, Iowa	1390		(Des Moines suburb)
Markham, Ontario	960		
Scarborough, Ontario	1350		
Veradale, Washington	1170		
Casper, Wyoming	1490		
Applications for new stations			
Gatineau, Quebec	1350		1,000/180 ND (to relay CIRA-FM Montreal)
Existing stations deleted:			
Chicago Heights, Illinois	1600	WCGO	

CHANGES:

Stations moved to new frequencies & locations			
Lithia Springs, Georgia	890	WJTP	from WWOF-1000, Walhalla, South Carolina
Stations requesting moves to new frequencies			
Montreal, Quebec	1410	CJWI	from 1610
Stations granted moves to new frequencies			
Brantley, Alabama	920	WEZZ	from 930 in Monroeville, 450 watts daytime only
Merritt, British Columbia	101.1	CJNL	from 1230 AM
Amherst, Nova Scotia	101.7	CKDH	from 900 AM
Stations denied moves to new locations			
Oak Park, Michigan	1600	WAAM	from Ann Arbor
Callsign changes			
Hanceville, Alabama	1170	WQHC	from WLYG
Selma, Alabama	1340	WJAM	from WMRK
Chugiak, Alaska	1160	KHFT	(new station)
Lompoc, California	1410	KSMA	from KUHL
Waycross, Georgia	1230	WAYX	from WWGA
Boise, Idaho	1430	KCMW	(new station)
Evanston, Illinois	1590	WCGO	from WONX
Fort Campbell, Kentucky	1370	WEGI	from WJQI
Neon, Kentucky	1480	WGCK	from WVSG
Fitchburg, Massachusetts	1280	WPKZ	from WEIM
Springfield, Massachusetts	1450	WHLL	from WMAS
Jenison, Michigan	1020	WONX	from WCGO
Columbia Falls, Montana	1400	KQDE	(new station)
Portland, Oregon	1150	KLPM	from KXMG
Tooele, Utah	1010	KPCW	from KCPW
Winchester, Virginia	610	WLVE	from WTFX

ND: non-directional
DA-N: directional at night only
DA-D: directional during daytime only
DA-2: directional all hours, two different patterns
DA-3: directional day, night and critical hours, three different patterns

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Handoffs and Simulcasting

To some, as they look upward into the sky, it may seem as if planes take off and just fly wherever they want. Actually, this does happen to a certain extent with General Aviation (Private) aircraft within specified, lower-altitude portions of the National Airspace (NAS). Outside of that, flights must abide by very specific regulations and many are under the control of Air Traffic Controllers who intently watch their radar screens while talking with the planes by radio. Radio hobbyists can, of course, listen in.

Understanding what is going on isn't as simple as you might think, unless you are already involved in listening to aircraft communications, but that's part of the fun – figuring it all out.

The sky (NAS) is divided up into three-dimensional but very well defined chunks of irregularly shaped airspace, called sectors, each with its own upper and lower altitude limits, its own Air Traffic Controller, and its own radio frequencies.

The following information should help to make more sense of it while using mostly airliners as examples.

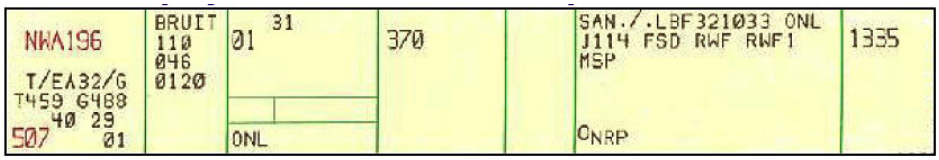
At Airports

Even before a departing airliner begins to taxi, the pilot will talk to Clearance Delivery to go over the intended flight plan and confirm the details.

Controller: *Southwest Nine Fifty Six, cleared to the Orange County Airport, via the FROGO SIX departure, and then as filed, maintain niner thousand, departure frequency one two seven point four, Squawk three three one one.*

Nowadays Clearance Delivery instructions are frequently delivered via digital rather than voice transmissions. A specific Squawk code is issued by the controller to allow ATC computers to follow it and to produce a more refined radar presentation, which includes a "data block" that accompanies the plane on the display with the flight information for that aircraft. For FROGO SIX Departure info, as an example, go to **www.airnav.com/airport/KSMF** and scroll way down to "FROGO SIX download (273KB)." The two parallel runways are shown near the top left.

Example of an Air Traffic Control radar display data block – Courtesy NASA Virtual Skies. It identifies the flight (American 278) and displays information needed by the controller. The plane and its path is depicted at the right moving upward.



A Flight Strip is in fact a strip of heavy paper with information printed on it relating to a given flight. The controllers keep them organized in holders by their radar displays for reference and to show the aircraft they are working. For more info see: **http://web.mit.edu/hfes/www/nd1.pdf**

After Clearance Delivery, the pilot contacts Ground Control to get permission to "push-back" (from the boarding area using a special tractor operated by the ground crew) and then taxi.

Taxiing on a large airport with multiple taxiways, turnoffs, ramp areas, loading gates, and other taxiing aircraft is often not a simple matter. The Ground Controller, who has a position in the Control Tower is the traffic cop, so to speak. He or she routes the planes where they need to go, while giving a best effort to not create traffic jams and delays.

Take a look at the airport diagram for Los Angeles International (LAX). Go to **www.airnav.com/airport/KLAX** and "Airport diagram Download PDF" on the right and you will get the idea.

Once the plane taxis to or near the departure end of the runway, the pilot contacts the Tower. In turn, and at the right moment while coordinating with other air traffic, the Tower will clear the plane for takeoff.

Handoffs

How does the pilot know what frequency to use next, since all the various controllers are on different frequencies? With the exception of airports where frequencies for Ground Control and Tower may not be automatically offered, each controller will give the pilot the next frequency to use and who to call. This is called a "handoff." The pilot will read back the frequency (and other ATC instructions) so the controller can listen for accuracy, sometimes called "hearback."

The pilot readback gives us, the listener, a second chance to catch the next frequency. It's the *only* chance to catch it if you can hear an airborne aircraft, but not the ground side of the communication.

Once airborne, handoffs occur periodically during the entire flight as a plane goes from sector to sector and eventually back to Ground Control for taxi instructions to the gate after landing at the destination airport.

Behind the scenes, controllers communicate regarding pending handoffs, which allows the next controllers to know what planes will soon be under their control and on their radar displays. "Flight Strips" are hand delivered (when within the same ATC facility) to the receiving controller, see image. For interesting info, see: **www.as.nasa.gov/atcseminar/previous/ATCSeminarARTCC.pdf**

The aircraft check-in on the new frequency with the receiving controller, as part of the handoff, can be quite brief.

Pilot: *Center, Skywest Sixty Sixty-Five, Flight Level three six zero.*

Controller: *Skywest Sixty Sixty-Five, good afternoon.*

Though other transmissions will follow from the controller, nothing more needs to be said by either at that moment and the controller now knows the expected plane is with him in his radar sector. At other times, the controller will immediately respond with instructions relating to altitudes, turns, and reports of other air traffic in the area.

Handoff Examples

- Ground Control handing off to Tower prior to takeoff: *United Three Three Two, One Six Right, taxi via Alpha Niner, Alpha, then Alpha Eight, and hold short One Six Right at Alpha Eight, and then contact Tower.*
- Tower handing off to Departure Control shortly after liftoff: *Southwest Nineteen Fifty, contact NORCAL Departure, have a safe flight.* Pilot: *Thank you, Southwest Nineteen Fifty, good day.* The Tower does not usually give the Departure frequency. It is given during the Clearance

Delivery phase.

Terminal Radar Approach Control (TRACON) facilities control air traffic during aircraft approaches to and departures from airports – "Approach Control" and "Departure Control" of just "Approach" and "Departure."

● Departure handing off to the Air Route Traffic Control Center (ARTCC) as the plane climbs to cruise altitude sounds nearly identical to the next one, but the altitudes, when mentioned, are lower.

● ARTCC sector to sector handoff: *United Nine Fifty-Four contact Oakland Center, one three four point four five, good day.* Pilot: *Thirty-four forty-five, so long.* The pilot abbreviates the response but all parties know it is 134.45.

In this case and the one directly below, the plane is "enroute," that is, at altitude and between airport departure and approach roles. The pilot will remain in contact with a controller for the particular ARTCC sector that the plane is in. Each ARTCC has high and low altitude sectors, not just sectors side by side.

● One ARTCC "Center" handing off to an adjacent Center – and in this case from an Oakland Center sector: *Southwest Seven Eighty-Three, contact Seattle Center one three four point niner.* Pilot readback: *Thirty-four niner, Southwest 783.* As above, the frequency is abbreviated and is 134.9. ARTCC map: **www.freqofnature.com/aviation/aviation_centers.html**

● ARTCC "Center" handoff to Approach Control as the plane descends from cruise altitude: *Southwest Ten Eighty-Three, contact NORCAL Approach, one two one point four five.* Pilot: *Twenty-one forty-five, Southwest Ten Eighty-Three, good day.*

● Approach Control handing off to the Tower: *Alaska Three Six Eight, contact Capitol Tower, one two five point seven.*

● Tower handing off to Ground Control: *United Four Four Five, contact Ground point seven, good day.* "Point seven" is understood to mean 121.7 since most Ground Control frequencies are in the 121.6-121.9 MHz range.

● Controller handing off to himself (yes, to himself): *Helicopter Six Juliet Hotel, change to my frequency one two five point four.* This happens when a controller is controlling two or more sectors and the aircraft moves from one sector to another under the same controller but a different frequency.

● Transoceanic airliner flight approaching the U.S. Pacific Coast being handed off by "San Francisco" (ARINC HF for U.S. West Coast) on frequency 8843 kHz (in this case): *Asiana Two Eighty-Four, contact Oakland Center, one three four point five five.* Pilot: *One three four five five, Asiana Two Eighty-Four.* Even though this flight was going to LAX in Southern California, it entered in Northern California, then flew inland and south to be handed off by Oakland Center to Los Angeles Center and then to SOCAL Approach before being finally handed off to the Tower at LAX.

"San Francisco ARINC" and "New York ARINC" frequencies: **www.faa.gov/ats/aat/ifim/ifim0109.htm**

● Flight being released from radar control (closing IFR Flight Plan) to fly under Visual Flight Rules (VFR) or when Flight Following is terminated: Pilot – *CalFire Nine Oh One, I'd like to terminate Flight Following.* Controller: *CalFire Nine Oh One, Roger that, Squawk VFR, radar services terminated, frequency change approved.*

Flight Following is radar service offered to VFR aircraft by request and with ATC workload permitting. "Squawk VFR" is an instruction to the pilot to reset the aircraft radar transponder to code 1200 from what had been assigned by the controller. After the Squawk code change, the aircraft will show up differently on the Controller's display as a VFR aircraft not under his/her control.

❖ Simulcasting

"Simulcasting" in the two-way FM communications world has a specific meaning, but in Air Traffic Control it simply means transmitting the same message on two or more frequencies at the same time.

Clearance Delivery and Ground Control are often combined with both functions transmitted on both frequencies. On some occasions, Tower and Ground Control can be combined.

Another simulcasting instance is when, during periods of low air traffic, two or more TRACON or ARTCC sectors are consolidated under one controller. If on a given frequency, you hear only some of the aircraft, the others are probably on the frequency of an adjacent sector. During these times, one must monitor all the frequencies for the combined sectors to hear all the aircraft. The aircraft will be transmitting on the assigned frequencies for the sectors they are in.

Controllers handle both civil and military aircraft. Civil aircraft are restricted to the VHF aircraft band (118-137 MHz). Military aircraft commonly operate in the UHF band (225-380 MHz) though they may use either band, installed equipment permitting. Accommodating both civil and military users requires yet more simulcasting. Most VHF ATC frequencies have a UHF frequency paired with it. When the controller transmits on VHF, the UHF pair frequency also comes up and likewise when the UHF frequency is used, the VHF frequency comes up. Again, to hear all the aircraft under a given controller's control, all the frequencies being used must be monitored.

Part of the fun of the hobby is to figure out all the sector and VHF / UHF frequency pairs for the ARTCC, TRACON, military airfields, and airports in your listening area.

Some listeners new to aircraft listening may hear controllers on UHF talking to airliners and falsely assume that the airliners also transmit and receive in the UHF band. This is not the case.

VHF / UHF simulcasting also helps all pilots in a given sector to be more aware of what is going on around them and to know when the controller may be busy talking to an aircraft on the other band.

❖ Reception

Of course, all the above assumes that you are within receiving range of a commercial airport and/or ATC facility or a Remote Controlled Air/Ground Communications (RCAG) facility. As distances increase, the aircraft on the ground are the most difficult to hear, followed by the ground stations, and leaving the aircraft in the air as the easiest to hear – particularly those which are line of sight to your antenna.

RCAGs are unmanned facilities that extend the radio coverage area for an ARTCC. This building is typical of those used to house the radio equipment. RCAGs can have a differing number of antenna towers depending on the number of frequencies installed. This shows two of the three towers for this RCAG.

Not everyone can erect an outside, pole-mounted antenna for one reason or another, but those who can should have one up as high and as reasonably in the clear as possible. This will go a long way toward receiving both sides of the communications.

❖ In Closing

To supplement this article, please consider reading these specific previous *MT Planes* column articles:

Monitoring Transoceanic Flights – MAY 2005;
Altitudes, Altimeters, Settings, and More – AUG 2005;
Tracking Domestic Airliners – MAY 2006;
Aeronautical HF – AUG 2006;
Base Station Aircraft Listening Antennas – NOV 2006;
Airport Information for Listeners – MAY 2007;
What is "Airspace"? – AUG 2007;
Radar, ADS-B, and the Future – FEB 2008;
TRACONs and Northern California TRACON – NOV 2008; and
AirNav.com – FEB 2009.

If you don't have them on hand, see *Monitoring Times Anthologies* on searchable CD-ROMs by year or the ten-year DVD: **www.monitoringtimes.com/html/mt_anthologies.html**

Email questions, comments, articles you would like to see. Until next time.

Books by Ernest H. Robl:
The Basic Railfan Book
Understanding Intermodal
The Powder River Basin
Detailed descriptions at
http://www.robl.w1.com

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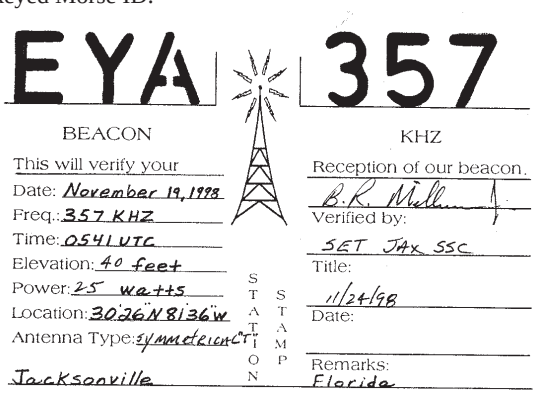
Summer Survival on LW

Welcome to the August issue of *Below 500 kHz*. Summer can be a challenging time for longwave, mainly because of summer static crashes and shorter hours of darkness. The band can still yield some surprises, however, if you do your monitoring in the early part of the day before static has a chance to build up.

I'm often asked if I have any tips for improved LW reception, especially during the warmer months. Listed below, in no particular order, are my Top 7 suggestions for success in longwave monitoring. While the focus here is on coping with summer conditions, these tips can be useful at any time of the year.

"Kevin's Top-7" Tips for LW Success:

- Try listening in the morning hours, before 10a.m. Often, there will still be some nighttime propagation in effect, and static crashes will be at their lowest levels of the day.
- If possible, turn off all static-producing devices such as TV sets, computers, dimmer switches, electric motors, fluorescent lights, etc.
- Use a narrow bandwidth setting. A narrow filter (500 Hz or less) will go a long way toward blocking out adjacent "pest" signals.
- Use a good set of headphones. They will help you focus on weak signals and avoid disturbing those around you.
- Use a loop or active antenna specifically designed for longwave. Despite their small size, these antennas often outperform "longwire" types, and almost always provide quieter reception.
- When trying for distant beacons, use your receiver's BFO or SSB/CW setting. You'll find it much easier to sort through weak signals by "zero beating" their carriers and listening to the keyed Morse ID.
- Tune slowly to avoid missing signals! Beacons are usually assigned to 1 kHz intervals. If you tune too fast, you might skip right over some good DX.


EYA 357
BEACON KHZ
This will verify your Reception of our beacon.
Date: November 19, 1998
Freq.: 357 KHZ
Time: 0541 UTC
Elevation: 40 feet
Power: 25 watts
Location: 30:26N 81:36W
Antenna Type: symmetricom
Jacksonville
STATION STAMP
Verified by: B.R. Miller
SET JAX SSC
Title:
Date: 11/24/98
Remarks: Florida

QSL for Beacon EYA, 357 kHz, Jacksonville, FL (Courtesy of Allen Renner, PA)

❖ Mailbag

Tom Humes, KF7ANQ, wrote in response to our SU/349 kHz puzzler a few issues back. He notes that since this unidentified signal has been reported in the Central NY area, it could be a facility associated with the City of Syracuse. One possibility is that it serves a heliport called SUNY Health Science Center, he says. Since there are just two letters in the ID, Tom also points out that it could be an FAA Outer Marker beacon, located near an airfield.

Thanks for writing, Tom. I wish we had more to report on this mystery station, but there have been no further reports of it sent to *Below 500 kHz*. There have been a number of NDB changes in the Syracuse/Central NY area over the past few years, and this may indicate that things are still not settled. How about some input from those of you in the Syracuse area? We'll report any updates here.

Bill Tobin (NM) had the following to report about using an ultrasound receiver to hear natural radio signals: "After reading the April 2009 *On the Bench* article on 'Monitoring Ultrasound,' I was curious if the Ultra-RX1 would pick up natural radio in the band of 40 kHz without being plagued by 60 Hz and its harmonics. It does!"

"I put together the kit as designed and it works perfectly to pick up ultrasound audio. Then, in place of the ultrasound microphone, I connected an LF Engineering loop antenna. I was immediately surprised at how the Ultra-RX1 came alive with sound—mostly white noise, but at times varying tones (indicating sine wave carriers being received), some appliance noises once in awhile, and lots of lightning crashes. And there is no 60 Hz and harmonic noise, even when used inside my apartment!"

"…*Monitoring Times* certainly spurs the mind to experiment with different fun things. A recent article on the 555 IC timer had me build a missing pulse detector. I had been looking for a way to detect very short millisecond power outages, and the missing pulse detector works for that. And I really like my Uniden BC396T scanner that was in the Grove Enterprises Bob's Bargain Bin. Thanks for your interesting *Below 500 kHz* articles every month."

Thanks for the kind words, Bill, and I'm glad to hear that the experimental spirit is alive and well out there! It stands to reason that the Ultra-RX1 used with an antenna would be useful for natural radio, while filtering out the 60 Hz hum that is so common when trying to hear these signals. Perhaps other readers will also try this technique. We haven't had any in-depth coverage of natural radio in some time, so I welcome any inputs from readers who are experimenting in this area.

❖ Loggings

Mike King, K3CXG, Frederick, MD is getting back into NDBs after a 3-year hiatus. He says that on first take there doesn't appear to be much new on the band, except for LYQ and SB, but he plans to explore things further. He is using his Sangean ATS-803A for DXing, and sends the loggings shown below.

Mike, I apologize that you had trouble reaching me through my *MT* contact address and had to mail your logs via postal mail. I was having trouble getting forwarded messages through that address for a while, but all seems to be working now. Keep us posted as you tune through the band.

Table 1. NDB Loggings from Maryland

FREQ	ID	CITY
198	DIW	Dixon, NC
216	CLB	Carolina Beach, NC
362	SB	Sudbury, ON
366	YMW	Manawaki, PQ
385	GAI	Gaithersburg, MD
516	YWA	Petawawa, ON
529	LYQ	Morrison, TN

❖ Thank You

With this issue, I'm marking 18 years with *Monitoring Times*. We've covered a lot of ground over that time, and hopefully encouraged a few folks to tune below the 530 kHz barrier. Although there have been many changes over that time, one thing will never change: My writing will continue to be geared toward what our readers want to see in longwave coverage. So keep the e-mails and postal mail coming, and be sure to share what you're hearing on the band. Photos are especially welcome. Thanks for 18 years of your friendship and support!

George Zeller
georgezeller@monitoringtimes.com

Pirate Radio Movie Opens in August

Universal Pictures announces that a new film, *The Boat that Rocked*, is scheduled for release during the summer. This movie is a comedy about pirate radio in the UK. Directed and written by Richard Curtis, the film stars Will Adamsdale and a large cast of other actors.

The plot revolves around the conflict between Offcom in the UK and **Radio Caroline.** A promotional trailer for the film is posted on U-Tube at:
www.youtube.com/watch?v=LkeVMPqka-M&feature=related

The use of pirate radio material in Hollywood movies is not unknown, but the recent crop of such films is about to arrive at your local theater. We thank Larry Magne for this heads up on the movie. Larry obviously pays attention to the world of film when he is not editing **Passport to World Band Radio**.

❖ NASWA Pirate Report

The North American Shortwave Association, still the largest shortwave radio club in the world, has announced a change of leadership in their popular "Pirate Report" column. Chris Lobdell, who has maintained this excellent column for many years, is turning over the editing duties to NASWA's Columbus, Ohio, chapter organizer Mike Rhode. Congratulations to Chris for a job well done for many years, and good luck from *MT* to the new editor!

Membership in NASWA includes their monthly publication *The Journal*. Annual dues are $29 in the USA and $31 in Canada via NASWA, 45 Wildflower Road, Levittown, PA 19057. For a preview, check out their **www.naswa.net/** web site.

❖ FM Pirate Bust

The Federal Communications Commission announced yet one more FM pirate bust on April 28. The FCC Denver office says that it busted Michael Stugelmayer of Cheyenne, Wyoming, for operating an FM pirate on 95.5 MHz from an attic in his apartment. Since 1993, Stugelmayer had broadcast eclectic programming. The *Casper Star Tribune* says that he aired jazz on Monday and Thursday, alternative rock and hits from the 1980s on other weekdays, and that he featured an "electronica" show on the weekends. The newspaper reported that Stugelmayer said that the bust had ended his goal of starting a career in broadcasting.

❖ What We Are Hearing

Monitoring Times readers heard nearly four dozen different pirate radio stations this month in a real DX extravaganza. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through typically used pirate radio frequencies to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Balls to the Wall Radio- Their programming is largely oldies rock music, despite their odd name. (None known)

Barnyard Radio- Chuck Manson hosts this rock music pirate that features numerous vocals by barnyard animals. (*barnyardradio@gmail.com*)

Blue Ridge Radio- Claiming to broadcast from the Blue Ridge Mountains of Virginia banjo music is their specialty. (*blueridgeradio@gmail.com*)

Calling Marco Radio- This apparent new one programs rock music amid calls to Marco, so the station name is descriptive. (*callingmarcoradio@gmail.com*)

Captain Morgan- The captain still programs rock music mixed with audio from the old Twilight Zone TV show. (None, says to send loggings to the Free Radio Network web site)

Channel Z Radio- Rock music, relays of other pirates, and pirate advocacy is their format. (*channelzradio@gmail.com*)

CHKN- Using a slogan of "the foulest shortwave station," their themes all involve chickens. (None)

Dead Cat Radio- The meowing cats on this one host rock music. (*cattus.mortuus@gmail.com*)

Derby Shortwave- This one comes back once each year with a delayed relay of the Kentucky Derby horse race bundled with some renditions of "My Old Kentucky Home." (*derbyshortwave@yahoo.com*)

Fake Numbers Station- There have been many of these over the years. The latest version has a conductor shouting "All Aboard" prior to the five digit coded messages. (None)

Grey Rhino Radio- This one claims to play rock music "by the cranberries." (*greyrhinoradio@gmail.com*)

KFUDD- On this new pirate, Ozzie Fudd uses a slogan of the "Voice of the Human Revolution" as he promotes Elmer Fudd. (None known)

KPR- Their "We Rock the Rockies" slogan describes their rock music format. (None known)

Liquid Radio- Their rock and dance music programming is different from other stations with that format. (*wwrbfm@gmail.com*)

MAC Shortwave- Paul Star and his young boy sidekick Ultra Man still produce oldies rock shows. Look for the old Radio Prague interval signal that they have adopted. (*macshortwave@yahoo.com*)

Mouth of Muhammad- This satirical pirate programs tunes such as "Put a Bomb in Your Shoe" and "50 Ways to Kill Bin Laden." (None)

Mystery Radio- Despite summer propagation, some east coast DXers are still hearing this Europirate on 6220 kHz around local sunset. (*radio6220@hotmail.com*)

Northwoods Radio- Jack Pine Savage adds a loon call "from the Great Lakes" to his rock music productions. (*northwoodsradio@yahoo.com*)

Radio Cinco de Mayo- You don't need to know much Spanish to know that this Mexican format pirate broadcasts on May 5. (*radiocincodemayo@gmail.com*)

Radio Clandestine- Somebody has been relaying old classic programs from R. F. Burns. Some think that this was the greatest pirate radio station of all time. (None current)

Radio Carp International- Just when you think that nothing is new, this station materializes as the voice of catching, eating, and cooking fish. (None announced)

Radio First Termer- This Dave Rabbit production from stations produced for USA troops during the Vietnam war is sometimes relayed by other pirates. (None, but now has a web site at **www.ibiblio.org/jwsnyder/rft/rft.html**)

Radio Free Euphoria- Captain Ganja operates the longest running marijuana advocacy station on shortwave radio. (Belfast)

Radio Free Speech- Bill O. Rights promotes freedom of speech with his classic pirate mix of rock music and comedy sketches. (Belfast)

Radio Gaga- Uncle Bob transmits rock music, sometimes supplemented with SSTV digital images. (*popeonthepoint@gmail.com*)

Radio Jamba International- The news at this veteran pirate is that they have announced that they will no longer be issuing QSLs via maildrops. But, listen to their shows to see if e-mail contact is possible. (None)

Radio Josephine- Music by women and commentary about women's issues is their focus. (*radiojosephine@gmail.com*)

Radio Oz- Their recent broadcast was subject to interference from WBNY, so details are sketchy on the station. The operator claimed to know other pirates and to be proud to now have his own station. (None known)

Radio Pigmeat International- Pigmeat Martin broadcasts classic rock and blues tunes. (*pigmeat_yoab@yahoo.com*)

Radio XXP- Little is known about this new station. Thus far it has featured rock music productions. (Unknown)

Sycko Radio- Sycko has been relaying other pirates with greater frequency lately, but his own rock music shows are still there. (*syckoradio@yahoo.com*)

The Crooked Man- Reruns of this classic pirate station about a man who fell out of the Hindenburg on his head have returned. He blames his psychotic state on the accident. (None)

The Crystal Ship- Reports of The Poet's demise were premature. He's back with rock music and leftist political commentary. (Belfast)

Thinking Man Radio- Their rock music is beamed to thinking men and women. We see their QSL here this month. (*Thinkingmanradio@gmail.com*)

Undercover Radio- Dr. Benway remains active with rock music and stories about his travels. (*undercoverradio@gmail.com*)

Voice of Honor- This new station appeared on Memorial Day with a mix of various military songs. (*voiceofhonor@gmail.com*)

Voice of KAOS- Old TV show music themes and rock music are blended with their protest of chaos in our lives. (*voiceofkoas@gmail.com*)

Continued on page 61

T.J. "Skip" Arey, N2EI
tjarey@monitoringtimes.com

Summer Solace

Ah yes... The Doldrums of August. I would say Dog Days of Summer but I don't want to remind my canine menagerie here at N2EI that they are beating the heat in air conditioned comfort. I like to keep them humble.

Between the periodic static crashes, I am enjoying nightly QSOs on 80, 40 and 30 meters. This is also the time of year that many of us climb the roof or whatever structure supports our antenna habits to get things right for the coming fall and winter season. Let's be careful up there! Safety first. Never work alone. Never work without proper safety gear.

While you are going over the antennas, do not neglect the various ground connections needed to make for a good (and safe) signal. Pay special attention to connectors along the ground wire path. Make sure everything is nice and clean and conductive.

This is also the time of year I like to dust the cobwebs off the piles of notes and sticky pads on (and under) my desk to bring you up to date on things that have yet "gelled" into a full column.

❖ Have you played the triple play yet?

Back when I began playing ham radio, new ops always talked about earning the "Big Three" awards. Those being: Worked All States (WAS), Worked All Continents (WAC), and the DX Century Club (DXCC). There was always the feeling that you weren't quite showing your full skills until these pieces of wallpaper graced your personal shack.

Well, it looks like Old Uncle Skip needs to go after yet another award to prove his basic radio chops. Recently, the American Radio relay League (ARRL) announced their "Triple Play WAS" award. This award is granted to any hams confirming QSOs with each of the 50 states on voice, CW, and using digital modes. You can start your tally log with any contact made after January 1, 2009.

Most of us like to live in our comfort zone when we play radio. We may work mostly voice. Some folks use only PSK31. You all know I am most happy with a key in my hand. This award forces us all out of our personally set limitations and gets us playing in modes other than our favorites. In other words, going after this award demonstrates a ham's overall proficiency in domestic radio communication – sort of important when you remember that we are often called upon to assist in times of trouble by whatever mode is available.

Anyway, here at N2EI I don't see any difficulty getting my phone and CW contacts. If I check my log I am probably a good way there on those two modes. But it looks like I will have to blow the dust out of my West Mountain Radio "Rig Blaster" and hook it up to the shack laptop.

My need to move forward with this is spurred on by the fact that Triple Play Plaque #1 was awarded to a ham in my very own ARRL Section, David W2YC, a member of the Gloucester County Amateur Radio Club.

You can go to the League's website for the complete details on how to chase this award: **www.arrl.org/awards/**. There is one small twist compared to other awards: You *must* post your QSO information using the ARRL "Logbook of the World" system. Tradition QSL cards will not be accepted for this award.

You can learn more about the Logbook of the World and how to set up your account at **www.arrl.org/lotw/**. If you are not on the LotW system yet, it is a great time to start. You not only can use it to work toward your Triple Play WAS, your logging through this system also counts towards all other ARRL supported awards. When you look at the expense of postage these days (especially overseas), the LotW is one of the best ways to play the confirmation game.

❖ Have you walked your talkie lately?

If you have read this column for any length of time, you know I like to play out of doors – bicycling, kayaking, camping, hiking. I have always done my best to convince you folks to join in on this kind of fun. That said, I know outdoor excitement isn't everybody's cup of Joe. But you can still play radio without playing as far from your home station as I tend to wander.

You can still get up from your operating station and, as my grandma used to say, "Blow the stink off." Make sure your handi-talkie is charged up and go out for a walk around your neighborhood. Sign in to your local repeater as "pedestrian mobile." That should certainly generate a bit of conversation.

Add the number of miles you walk to your log book. That gives a whole new meaning to the term "Miles Per Watt." Talk up the "Walk Your Talkie" idea at your next club meeting. Maybe set up a sked where you and some of your radio buddies maintain contact via the repeater while gadding about your prospective neighborhoods. Almost everybody can benefit from a good walking regimen. I am not ignoring our differently abled brother and sisters, either. I know you folks to be a creative and tenacious bunch in general. You will certainly find your own way to join into this type of fun.

Back when I started playing ham radio, if you walked down the street talking into a radio people looked at you funny. Now they just think you have a large format cell phone of some sort.

❖ Hope for the Future

You sometimes see folks writing about how our hobby is "aging." I have to admit that many of the QSOs I have down in the CW portions of the band are with folks in the Quarter Century Wireless Association. Most of the younger folks that do participate in our hobby tend toward the newer modes, running up in the VHF and UHF portions of the spectrum.

I sometimes wonder what will happen when the elder statesmen (and stateswomen) on CW bands go silent key. That was before I looked in my PO Box this morning and saw an envelope addressed clearly in the handwriting of a very young person. In it, I found a QSL card from Evan KC0TOX. This young man not only enjoys working CW, but he even built his own Elecraft K2 to do it! So, next time you despair over the future of our hobby, give a thought to those young folks who actively and enthusiastically keep the flame alive.

This gives me an opportunity to remind you that helping a young person build even a simple kit is a great way to get them started on the road to all the fun that we have in the amateur radio world. Code practice oscillators, clocks, audio amplifiers, and low part count RF circuits are all great ways to get a kid melting some solder. I know that old saw about giving a man a fish versus teaching him to fish. I like to think that teaching a kid to solder beats fishing any day of the week! My apologies to all you angling amateurs out there.

❖ Speaking of Elecraft rigs...

The "K2 to K2" QSO I had with KC0TOX reminded me to give you folks a glimpse over

my shoulder at a recent project of mine. While I use my K2 as my primary home station rig, I also have a small, but full featured Elecraft K1 that I built some years back for use when camping and traveling. In getting my portable station together for this season's outdoor fun, I decided to lift the lid and make a few updates.

One of the great things about the Elecraft radio community is that both the designers and users are always looking for ways to update, improve, and modify their rigs. How many other manufacturers not only encourage modification but post the best of the best on their company web site?! (**www.elecraft.com**)

Anyway, in addition to my annual check-out of boards and connections followed by a good old fashioned tweaking and peaking, I decided to add a couple of features that I had not previously put into the radio. These were not necessary until I decided to start taking the K1 on multi-day kayaking expeditions.

Since I usually only get near my radio after the sun sets on such excursions, I added Elecraft's LED backlight kit. Since my K1 was long since built, the modification was a bit more complicated, but all went fine.

Next up came the addition of the internal battery adapter for the K1. In the past, I usually went auto-based camping so I tended to use the rig with a small gel cell. Kayak camping requires things to be packed a bit tighter and smaller. The internal battery modification allows me to work a few hours every night throughout a long weekend without any problems. Even the addition of the LED backlight did not draw enough power to really compromise my radio play time.

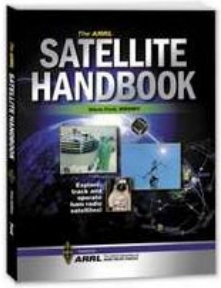
The newly updated rig now resides (along with mini-key and antenna wires) in a padded waterproof case made by the Pelican people (**www.pelican.com**). I was first introduced to these cases when I began kayaking and swift water rescue training. They are tough, obviously waterproof, and available in a range of sizes, shapes, and internal padding to suit any need. If you are looking to take any electronics tools or toys anywhere more rugged than your living room, you will want to give these cases some serious consideration. Highly recommended!

THE ARRL SATELLITE HANDBOOK

By Steve Ford WB8IMY
ISBN# 978-0-87259-985-7
ARRL Order # 9857
$24.95
The American Radio Relay League
225 Main Street
Newington, CT 06111-1494
www.arrl.org/shop
1-888-277-5289

If you are looking for something different to read at the beach this summer, take a look at Steve WB8IMY's latest offering.

Let's face it: We live in a world where, in many cases, mentioning Amateur Radio might be lucky to draw a yawn from some folks. But ever since I entered the hobby, I have always found one topic of ham radio that gets non-hams interested every time: All I have to do is say, "You know, we put up our own satellites



and use them to talk to each other." That line always draws folks in.

That said, the percentage of hams who have taken advantage of our satellites remains small, even though it has never been easier to get on the air through our amateur birds. We have come a long way since those amazing days of OSCAR 1 back in 1961.

QST Editor Steve Ford WB8IMY has put together a great single source book to make it possible for any dedicated ham to enter into the world of space communications.

The book begins with a history of ham satellites to help you see how we got to where we are today. Next you will learn that the key to getting your signal over our birds is understanding orbits and tracking. This is followed by a chapter on space communications systems, and then a chapter on how to set up your ground station.

Once you have your station sorted out, you will learn basic satellite operating procedures. Additionally, there is a chapter on ham satellite projects, including many unique antenna designs that will make working satellites a snap.

The book includes two Appendix chapters by Dr. Martin Davidoff K2UBC. These include a scholarly study of satellite orbits and a study of satellite systems themselves.

If you are interested in joining in the fun of space communications, the knowledge shared in this book is well worth the cover price.

Have fun, folks! I will be listening for you between the static crashes on the bottom end of 40 meters.

UNCLE SKIP'S CONTEST CALENDAR

European HF Championship
August 1 1200 UTC - 2359 UTC

10-10 Int. Summer SSB Contest
August 1 0000 UTC - August 2 2359 UTC

North American QSO Party (CW)
August 1 1800 UTC - August 2 0600 UTC

ARRL UHF Contest
August 1 1800 UTC - August 2 1800 UTC

ARRL 10 GHz and Up Contest
August 15 0600 Local - August 16 2400 Local

North American QSO Party (SSB)
August 15 1800 UTC - August 16 0600 UTC

New Jersey QSO Party
August 15 1600UTC - August 17 0400 UTC

Run for the Bacon QRP Contest
August 17 0100 UTC - 0300 UTC

Ohio QSO Party
August 22 1600 UTC - August 23 0400 UTC

Outer Limits continued from page 59

Voice of Spike- Spike Jones novelty music dominates their broadcasts. (None announced)

WBNY- Commander Bunny at the Rodent Revolution has become one of the most prominent North American pirates that is now active. (Belfast and *rodentrevolutionhq@yahoo.com*)

WEAK- Their rock music shows have stronger signals than their call letters would indicate. (*weakradio@gmail.com*)

Wind Up Radio- They claim to transmit "mellow music" shows. Lately that has consisted of classic rock. (Unknown)

WPON- "The Weapon" combines rock music with explosive sound effects and leftist political commentary. (None)

Wolverine Radio- Their rock music shows have been widely heard. The announcer's diction sometimes makes their ID sound like "Long Range Radio." (None)

WTCR- "20th Century Radio" plays music from that century, from ancient pop to contemporary rock. (Belfast)

Yellow Rhino Radio- They claim to be a reactivation. Rock music and television theme music dominate their broadcasts (*YellowRhinoRadio@gmail.com*)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses:
PO Box 1, Belfast, NY 14711
PO Box 109, Blue Ridge Summit, PA 17214
PO Box 146, Stoneham, MA 02180
PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings is the e-mailed *Free Radio Weekly* newsletter, free to contributors via *freeradioweekly@gmail.com*. A few pirates will sometimes QSL reports left on the outstanding Free Radio Network web site, at **www.frn.net**. *The ACE*, a formerly widely read print bulletin, now has a good loggings section and a valuable archive of *Free Radio Weekly* issues at www.theaceonline.com/

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors**:** Brian Alexander, Mechanicsburg, PA; Skip Arey, Beverly, NJ; Artie Bigley, Columbus, OH; Rich D'Angelo, Wyomissing, PA; Ragnar Daneskjold, North America; Gregory L. Dome, Onalaska, TX; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Rick Helmke, Auburn, AL; Vashek Korinek, South Africa; Ed Kusalik, Camrose, Alberta; Chris Lobdell, Tewksbury, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penns Park, PA; A. J. Michaels, Blue Ridge Summit, PA; Adrian Peterson, Indianapolis, IN; Lee Reynolds, Lempster, NH; Mike Rhode, Columbus, OH; Lee Silvi, Mentor, OH; and Joe Wood, Greenback, TN.

Clem Small, KR6A
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Antennas and Resistors

When transmitting a signal, an antenna's efficiency is a ratio or comparison of the portion of (RF) actually radiated as radio waves compared to the amount of energy supplied to the antenna from its feed line. For a receiving antenna, efficiency is the degree to which the antenna delivers to its feed point the energy it captures from passing waves.

In both transmitting and receiving, the electrical resistance in the antenna's conductors is called "loss resistance." This is because, when RF current flows in this resistance, some RF energy is lost as heat. Loss resistance is generally a major cause of low antenna efficiency.

In comparison to losing energy from an antenna as heat, there is a different way in which RF energy is "lost" from the antenna. That is, of course, by the radiation of RF energy from the antenna – launching that energy into space as radio waves. The basis of "losing" this energy by radiation is known as "radiation resistance."

So, if you have an antenna with a low value of loss resistance and high value radiation resistance, the antenna will be relatively efficient: more energy is radiated as radio waves than is lost as heat. On the other hand, with a high value of loss resistance and a low value of radiation resistance, an antenna will be relatively inefficient: more energy is lost as heat than is radiated as useful radio waves.

❖ Can Adding Loss Resistance Ever be Desirable?

Surprisingly, there are several antennas for which adding loss resistance produces results that are useful in some situations. Let's take the resonant-rhombic antenna (fig. 1A) as an example. The resonant-rhombic is a respected, directional antenna with a good amount of gain. It has directional radiation and reception in two opposite directions. This can be desirable if we want communication in both these directions.

But, often we want communication in only one of these directions. If an appropriate-value resistor is connected to the resonant-rhombic at one end, then the antenna becomes uni-directional. This is because the resistor converts to heat some signals that would be fed from the antenna to a receiver or launched from the antenna as radio waves. These are signals that would be received from, or launched toward, the direction opposite the end with the added resistor.

A plus is that reception in the remaining direction is no longer bothered by electrical noise, and interfering stations that formerly might come from that direction have been canceled by the resistor. A further plus is that the elimination of radiation in that cancelled direction means that signals from the antenna will no longer cause unnecessary interference to communication in that direction. And, with the addition of the resistor, the antenna becomes non-resonant, so it has a much wider bandwidth, which is sometimes a useful feature.

Other bi-directional antenna designs which can be similarly made uni-directional by adding an appropriate resistor are the resonant long-wire antenna, the resonant-V antenna (fig. 1B), and the Beverage antenna (fig. 1C).

A different antenna, the T2FD (fig. 1D), utilizes an added resistor solely to increase its bandwidth. Its radiation and reception patterns are essentially the shape of a half-wavelength dipole, but with less intensity due to the loss in the added resistor.

❖ Another Antenna-System Resistor

So-called "antenna matching circuits," utilizing nothing more than a loss resistance, have also been marketed. These devices are actually a resistor to be attached at the antenna's feed point. In many situations, the resistor lowers the SWR measured at the point where the feed line attaches to the antenna – whether the antenna is actually connected or not!

That SWR is an indicator of the degree of impedance match at the antenna, not of antenna efficiency. As with the resistor-added antennas, this device converts a significant amount (about half) of the energy fed to the antenna into heat. These devices have sometimes been described as being essentially a "dummy load" (defined below).

❖ And So -

Is it worth reducing an antenna's efficiency by adding a resistor to the antenna in order to get the change in radiation-reception pattern, the increased bandwith, or the improved SWR discussed above? The answer depends on the application in which the antenna is utilized.

In some situations, the reduction of interference due to pattern change and/or the increased bandwith offered by the antennas discussed above can be advantageous. Even the antenna matching circuits utilizing a loss resistor are sometimes reported to be valuable for their broadband characteristics and for the instantaneous band-changing they make possible.

Keeping the SWR relatively low is a desirable and necessary feature with more modern transmitters and transcievers. Although these matching resistors dissipate about half the energy supplied to the antenna as useless heat, they do keep the SWR relatively low across a wide bandwidth. Most radio operators prefer to keep the SWR acceptably low with much lower loss circuits such as an antenna tuner.

❖ Another Consideration

Another factor to consider is that, for reception on the HF band and bands lower in

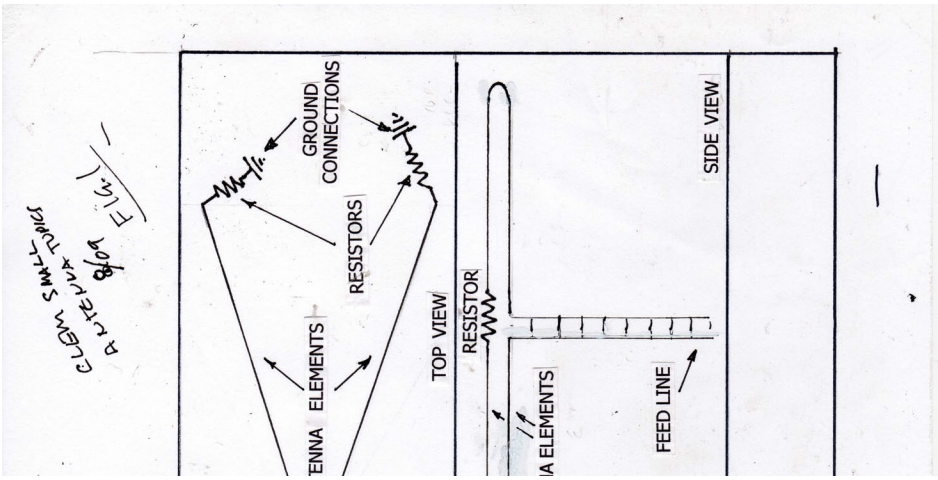

FIG. 1. A RHOMBIC ANTENNA WITH TERMINATING RESISTOR (A), A V ANTENNA WITH TERMINATING RESISTORS (B), A RESISTOR TERMINATED BEVERAGE ANTENNA (C), A T2FD ANTENNA (D).

This Month's Interesting Antenna-Related Web site:

Info on the T2FD antenna:
www.korpi.biz/t2fd.pdf
Then it discusses network topics:
www.vias.org/wirelessnetw/wrapnt_antennas_and_transmission_lines76.html
This web site has a book which briefly discusses (in section 7.2.2) the very-low level of noise generated by the antenna itself:
http://books.google.com/books?id=peUFLCy4zLYC&pg=PA221&lpg=PA221&dq=%22noise+produced+by+the+antenna+itself%22&source=bl&ots=kO8mk_bO02&sig=tp72k_mIxroDyo9CU-bw_Ze25v2g&hl=en&sa=X&oi=book_result&resnum=1&ct=result#PPA221,M1

frequency, the quality of reception depends on signal-to-noise ratio rather than simply on signal strength. So, on these bands where noise level is significant, reduced received-signal strength is usually not the serious problem it is on the higher frequencies. Thus, the loss of received-signal strength with the T2FD and the resistive, antenna-matching circuit may perhaps be tolerated in some situations without serious compromise of received-signal quality.

Keep in mind, however, that we're talking only about reception here: for transmitting, added loss resistance reduces the amount of RF energy launched from an antenna on any band.

RADIO RIDDLES

Last Month

I asked: "There's the old question that goes something like: 'If a tree fell in a forest, and no one was around to hear it would it still produce a noise?' Well, in a similar vein, if an antenna were far off in outer space, and no transmitter, and no receiver were hooked up to it, would it still receive and/or transmit electromagnetic (EM) waves (radio waves)?"

Well, we know that there is a lot of radio noise in outer space: we receive some of it in our radios here on earth as "cosmic noise." So, at a minimum, the antenna in question would receive some of that cosmic noise around it, as well, no doubt, as some weak signals coming from earth. And with no load connected to the antenna (i.e. no receiver) to absorb the received energy, the antenna would re-transmit the energy that it received, minus whatever energy was lost as heat in the antenna's resistance.

Also there is the electrical noise (discussed in the past month's riddle answer) generated within the antenna itself. This current would produce a very tiny amount of electromagnetic-wave radiation. So yes, the antenna would both receive and transmit EM waves, even though we wouldn't be there to notice it. Some philosphers would differ with me on this, but that's my story, and I'm stickin' to it.

This Month

The Beverage Antenna mentioned above functions in a manner rather different than most other antennas. What is this unusual mode of operation? Also, the Beverage Antenna is frequently referred to by what other name?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

❖ By the Way

There's another "antenna" in which a resistor is a useful component. This is a substitute antenna usually called a "dummy load." A dummy load is a resistor with a value of resistance to which a transmitter is to be impedance matched. Instead of radiating RF energy fed to them, dummy loads convert that energy to heat.

When tuning up a transmitter, a dummy load can be used instead of a regular antenna that would radiate the RF energy fed to it. Radiating signals during tune-up can create a source of unnecessary radio interference.

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This Month – A Mixed Bag

❖ A.C.-D.C. Safety

Derick Ovenall, N3EGR, who has made many contributions to this column in the past, sent an important tip on safety in a.c.-d.c. sets to Bob Grove our Publisher. He was prompted by Bob's article on "Hazards of the All American Five," which appeared in the May 2009 *MT*. It's a tip that Derick discovered on Brian Ripley's very interesting Hallicrafters S-38 web site, **www.the-s38guy.com**, and used in Derick's own S-38 restoration. However, it applies to almost any a.c.-d.c. radio.

To illustrate Brian's tip, I'm showing the filament circuit of the National SW-54, a little a.c.-d.c. short-wave radio I restored on these pages back in 2001. Notice that one blade of the a.c. plug is connected to chassis ground through the on-off switch. Now, back in the less safety conscious age when these a.c.-d.c. sets were built, both blades of these plugs were the same width and so the plug could be inserted into the outlet in either direction.

If the plug were inserted one way, the harmless ground, or neutral, side of the a.c. line would be connected to chassis ground through the switch. Insert the other way and the "hot" side would be connected to chassis ground. That would be a "shocking" problem for someone who came in contact with both a metal part of the chassis and a water pipe, radiator or damp basement floor.

Back when these radios were new, the danger was probably minimal. But over the years, the fibreboard backs had a way of cracking and coming apart. Sometimes knobs disappeared as well, exposing metal chassis parts to the touch. The chassis mounting screws on the bottom of the cabinet represented another accident waiting to happen.

And so, as a conscientious restorer, you would want to substitute a line cord with a polarized plug for the original cord – which is probably cracked and broken anyway. And you would want to install it so that the lead from the wide blade (which is connected to the neutral side of the line if the outlet is wired properly) is the one that becomes grounded to the chassis.

Now everything's safe – right? Wrong!! Almost all a.c.-d.c. sets, as in the SW-54, had the on-off switch in series with the lead going to chassis ground. With the switch closed – no problem. But after the switch is opened to turn off the radio, the neutral lead is removed from ground and the chassis becomes hot.

Why? Trace the other (hot) lead from the plug and you'll see that it is connected to the chassis through the series heater string. Those heaters would not present any obstacle to your receiving a nasty shock if you touched a chassis part while in contact with ground. So what to do? It's simple. Move the switch so that it breaks the hot side of the line and wire the ground side directly to the chassis. Now the set will be safe whether the switch is on or off.

And by the way, if your fiberboard radio back or set bottom is broken or missing, Derick recommends visiting **www.retro-tronics.com**. I looked, and they do indeed stock replacements for an amazing variety of radios. They'll also do custom cutting.

❖ Stubborn Screws and Rings

John Dellinger suggests that a left-handed drill bit could be useful in removing stubborn knob set screws such as the ones I'm running into in the current Hallicrafters S-20-R Sky Champion restoration. It cuts backwards with the drill motor set to "reverse." I hadn't heard of such bits, though I do know that there *are* special bits made specifically to be screw extractors. If any reader has tried something like this, I'd like to hear about it!

My set screw problem also resonated with *Larry Margrave*, who was having similar problems with four knobs on his Hallicrafters S-11 "Super Skyrider." He asked me to contact him if I were to find a solution – and I just e-mailed him that I have been successful. More on this later in the article.

In the June 2009 issue, I relayed a reader's brief tip that a company called Tessco (**www.tessco.com**; 800-472-7373) is a current source for the special wrenches used to back off those decorative ring nuts so often used to secure panel-mounted toggle switches. *E. Kirk Ellis, KI4RK,* advises that Tessco is a well-known supplier of parts for the cell phone and two-way radio industries. The ring wrenches sold by Tessco are made by GC Waldom Electronics. GC#9358 is for 1/2" nuts; GC#9359 is for 5/8" nuts.

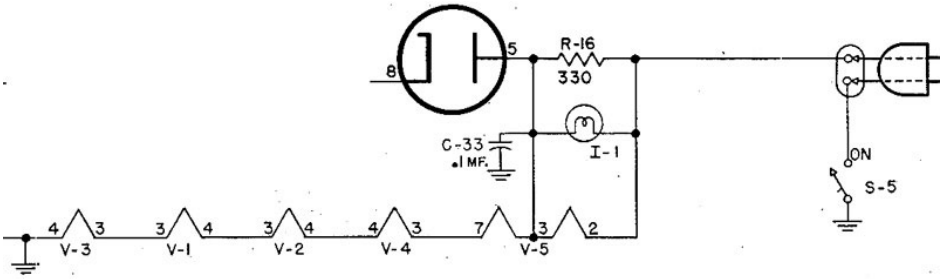
❖ Component Replacement Issues

Reader *Reg Curtis, VE9RWC,* is considering a first-attempt restoration of a Hallicrafters SX-100. He has asked a few basic questions that certainly must occur to other first restorers and are well worth discussing here.

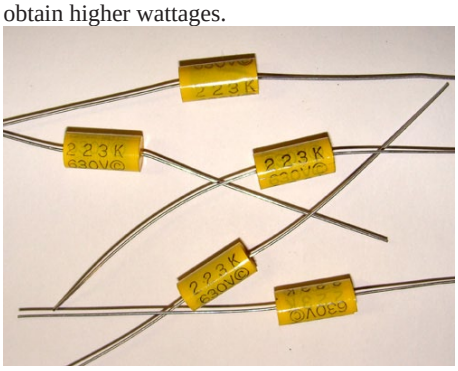
1. What style of component is used to replace the old tubular paper capacitors and, when necessary, defective resistors?

For the capacitors, I use the very economical "Metallized Polyester Film" units as sold by Radio Daze (**www.radiodaze.com**). These have always proven to be very satisfactory. But for those who wish to go super first class, there's also the "Orange Drop" series available from the same source.

When it comes to resistors, the plain vanilla carbon composition ones are fine for the usual 1/2-watt applications. You may have to switch to other styles of resistors (such as carbon film, metal film, metal oxide, or power resistors) to obtain higher wattages.



Filament circuit of the National SW-54 illustrates Derick Ovenall's safety point (see text).



Inexpensive "Metallized Polyester Film" capacitors are good replacements for the old paper versions.

2. What about the ceramic capacitors used to bypass the a.c. line where it enters the set?

If a good ceramic capacitor is already installed, it might not be necessary to replace it. However, a paper capacitor in this position should definitely come out and – whatever the original voltage rating might be – it's recommended that the replacement be rated at least 1000 volts. The Orange Drop line already mentioned includes a 1600-volt series.

3. *When removing old components, is it better to unsolder them from their origination point (such as a tube socket lug) or is it okay to clip out the component, leaving a stub of a lead at each end, and solder the new component to the stubs?*

I'm a pragmatist and my advice is "whatever works." If there are only a few wires on the lug in question and they aren't wrapped too thoroughly, use some a soldering iron with some "solder sucker" braid on the lug, followed up by the use of a sharp tool and heat to back out the wire wrap. Otherwise, leave stubs and solder to them.

Some restorers like to make little hooks on the ends of the stubs and component leads, then interlock the hooks, close them with pliers, and solder. I like to use non-insulated butt connectors like Radio Shack 64-3036. They are designed for crimp-on applications, but take solder very well. Slide the leads to be spliced into opposite ends of the connector and solder.

❖ AWA Annual Conference

The annual Antique Wireless Association "Rochester Conference" (actually in Henrietta, New York) happens this month from August 20-23. This year, for the first time, the event – formerly open to members only – is open to the general public. The $20.00 admission fee gives conference attendees access to activities that include the flea market, book fair, seminars, auction and old equipment contest.

The theme of this year's conference is "Kit Radio." One of our seminars, "True Confessions of a Heathkit Addict," deals with that theme. And the Old Equipment Contest, which includes many spectacular member-created displays of radio equipment and radio ephemera, is also expected to include a lot of classic kit material.

Other seminars include a report on shortwave and longwave listening, a showing of vintage radio lantern slides, a display of pre-1912 apparatus, a key and telegraph seminar and much more – including a two-hour radio restoration forum hosted by your *MT* "Radio Restorations" columnist. It will feature a cone speaker repair expert, the noted author of a book on RCA Radiolas, a review of the restoration of a 1920s ham transmitter – and, yes, a power point presentation of one of my recent *MT* restoration projects.

No conference attendee should go home without taking advantage of the opportunity to visit our spectacular museum and museum annex – an easy 20-mile drive from the RIT Conference center, where the Conference is held. There

The AWA Conference flea market offers opportunities to acquire exotic radio goodies.

you'll have a chance to visit a 1920s radio shop, view amateur radio equipment from the spark era through modern times, visit an accurate recreation of the *Titanic's* radio room and much, much more!

If you look at the little Conference ad that appears on these pages, you'll notice that one of the features mentioned is "Good Fellowship." That's not just advertising hype! The AWA Conference attracts many who are especially knowledgeable in the art and science of vintage radio and electronics. And, to a one, they enjoy chatting and sharing their expertise.

I hope to see you there! Visit **www.antiquewireless.org** for more information.

❖ Sky Champion Progress

Readers who are following this restoration will remember the difficulty I had in merely removing the set from its front panel/cabinet. Thanks to a broken retaining screw in the bandswitch knob (obviously the result of a previous owner's feverish attempt to dislodge the screw from a frozen state), I had to drill the screw out. That resulted, unavoidably, in my drilling a bit into the bandswitch shaft.

The next problem was the removal of the decorative "ring nuts" used to secure various toggle switches to the front panel. Even the most excellent ring removal tool I received from reader Perry Crabill wouldn't budge them. And, of course, any attempt to remove them with pliers would have only chewed up the rings and the panel.

The answer to this came from a tip on the internet. Tapping the rings counterclockwise may have been hard on the tiny jeweler's screwdriver I sacrificed to do the job, but the successive impacts were just the thing to break the grip of decades.

So now my Sky Champ is all ready to be worked on – but first I had to repeat this whole exercise on another S-20-R, the one I plan to use for parts. I'd like to use the cabinet of the parts set, which is a little better than the one on the set to be restored (for one thing it's not drilled with extra holes). I also need to salvage the speaker for use on the restoration set and I want to see if I can remove the bandswitch shaft to replace the one I had to drill into.

I did test the bandswitch knob set screw on the parts set as soon as I realized that it could be a problem – and it was. I put as much screwdriver pressure on it as I dared and it still wouldn't budge. And so, I turned the set upside down and moved each control so that its set screw was pointing up. The, over a period of three weeks, I gave each setscrew an occasional squirt with WD-40.

The result: every one of the setscrews gave up with only moderate screwdriver pressure. And as a bonus, all of the retaining rings yielded to Perry's ring removal tool. More next time!

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www.midnightscience.com

A Low Frequency Audio Generator

By Carl Herbert AA2JZ

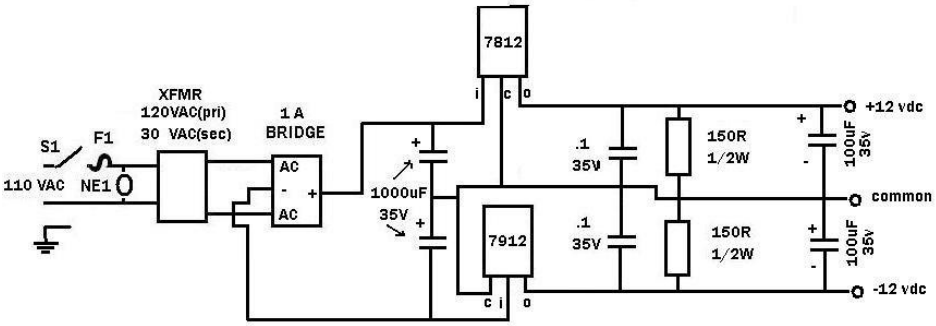
Sure enough, as I began work, my ancient "Lafayette 99-5015 Signal Generator" decided that it no longer wanted to participate in my quest. I've been working with some circuits which required a low frequency audio input for testing. I suppose that 40 or 50 years of service is about all that one can expect from "tube type" gear. Besides being large and bulky, tube gear is not overly efficient with power consumption, so I decided that it was time for something smaller and more efficient. Expense is always a deciding factor as well.

Equipment with a frequency range from about 1 hertz to 150 kilohertz would be nice, as would a means for signal quality and control. Square wave output is sometimes needed, and it would be great if it, too, could be included in the design. That's not asking for too much, is it?

Conducting a search of various texts[1] and websites[2], I found that Wien Bridge Oscillators are relatively easy to construct, and would provide the frequency range and options I wanted.

First Things First

Noting the small physical size of the circuit boards and power supply requirement, I chose a salvaged data switch box as the chassis. This one measures 7-1/2 x 6 x 2-1/2 inches and meets the need with ample space. The original wiring and hardware were removed and cover plates were fabricated from vintage circuit board stock I have been saving. Aluminum roof flashing would also have sufficed for covering the original holes, but I didn't have any that wasn't usable for its original purpose.



Dual voltage power supply...note the wiring difference between the positive regulator (7812) and the negative regualtor (7912). The two 150R 1/2 watt resistors are "bleeder resistors," used to remove stored voltage when the circuit is powered down.

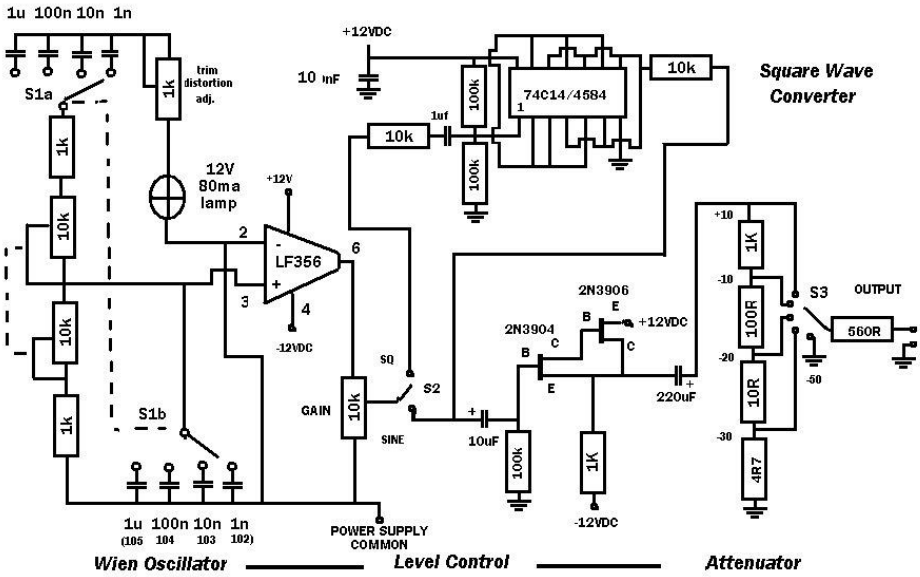
The dual voltage power supply section was the first to be constructed. You can't check the remainder of the project without the proper "juice," so I began here. The junk box provided a salvaged power transformer with an input of 110 volts AC and a secondary output of 38 volts AC.

The two voltage regulators to be used, (7812 and 7912), and the remainder of the parts, dissipate some of the input voltage as heat; therefore, the transformer selected must be capable of providing an output in excess of the total of the voltages needed. Heatsinks on the two regulators are a necessity and shouldn't be ignored. A suitable fuse holder was removed from a salvaged board, drilled to accept a machine screw hardware, and insulated from the chassis.

Look at the power supply schematic and note the difference between the 7812, positive regulator, and the 7912, negative regulator. The "input and common" requirements are different. I don't know why they're made this way, but it will save you a lot of "head scratching" knowing that they were made this way.

Also note that this power supply provides a "common" output, along with the 12 volt positive and negative outputs. The common output is NOT at ground potential and shouldn't be attached to chassis ground.

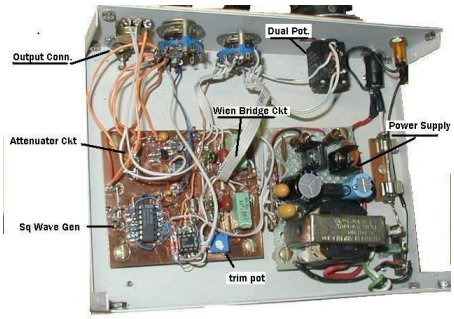
Those two 150 ohm 1/2-watt resistors are dropping resistors (bleeders). They remove the stored voltage from the capacitors when the unit is turned off. Without them, the circuit can contain "residual voltage" and could give you a "surprise" should you be working around the circuit. The power supply board measures 2 x 3 inches; yours may be larger. The power indicator on the front panel is a Radio Shack® 115VAC neon type.



Building the Wien Bridge Oscillator

The power source having been completed, the heart of the project is next. I opted to use "Manhattan Style" construction[3] (modified "dead bug"), but the choice of building type is yours. My board measures 3-1/4 x 3 inches, and again yours may be larger. Build using the measurements you're comfortable with, but consider carefully what will "fit" in your enclosure. Don't forget to allow room for those switches and the dual potentiometer. It's frustrating to finish the board, only to find that it won't "fit" in the enclosure!

While we're in the "fit" mode, placement of the switches and such are important. I try to achieve symmetry with regard to the front panel controls. This can be time consuming, but is well



worth the effort. The physical size of your components (switches, pots, etc.) occupies space, as do the control knobs. Standing the chassis on end with the front panel "up" will allow you to move the knobs around to find the best placement. Remember also to consider the physical size of the parts behind those knobs. Many times, the hardware I originally desired just wouldn't fit the size of the panel, so alternatives were selected.

The Wien Bridge Oscillator[2] has been described in detail in the schematic. Briefly, the circuit uses regenerative or positive feedback, and a closed loop gain of unity. As the filament of the incandescent bulb heats up, the filament resistance increases. This decreases the gain of the amplifier, as the output signal is fed back to the input. This arrangement provides a stable output amplitude.

The trimmer resistor (1k Ohm) can be adjusted to eliminate distortion on the output signal. Wiring isn't critical, but you should try to avoid placing capacitors physically in parallel to avoid additional capacitive reactance.

Some other items to note in building are:

1. Use XR7 (10%) ceramic capacitors for the two identical sets in the oscillator circuit.
2. The 12 volt 80 milliamp incandescent lamp used is a salvaged #8362, but a 6 volt 60milliamp unit will also work (#63 or similar). Try what you have available.
3. My LF356 works fine, but so should TL071CN, TL081CN using the appropriate pin out configuration for wiring.

❖ Square Waves

Now for the Square Wave Converter. The 74C14/4584 device, a CMOS Hex Schmitt trigger inverter used here, will function properly with 12 volts DC applied. A 74HC14 cannot be used because the voltage will instantly destroy the device.

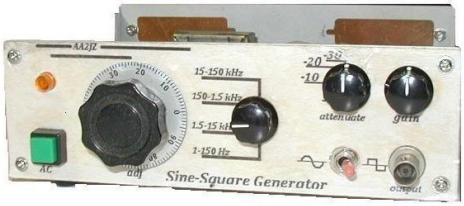
Switch S2 is used to select either a Sine or Square Wave output. It should have been a double pole double throw unit, the second half used to remove DC from the 74C14, and therefore avoid the possibility of "spikes" in the sine wave output. I didn't have one and used a single pole as shown. Thus far, it's working just fine.

Layout and wiring of this section is very easy and is not critical. It is followed by the level control and attenuator circuit. I used 1/4-watt 1% resistors here. Accuracy is "pretty good," but remember that this isn't a laboratory instrument, and will be used for basic testing. etc.

The output from the unit is taken following the attenuator circuit via a BNC panel mount connector. Your choice of connectors applies here. Frequency out is measured with a bench frequency counter to "see" where you're at.

Completion of the front panel was fun! It was accomplished using the "Paint Brush" software in my computer. Several tries were necessary to have the logos properly align themselves with the holes in the front panel, while having the data remain readable. The marking for the Output Frequency Range are approximate. Variations in output can occur, depending upon the layout of the parts, tolerance of the parts used, etc.

The completed "paper decal" was then adhered to the front panel using spray adhesive, and then covered with self sticking clear plastic. The clear adhesive backed product came from the home decor section of our local department store. I suppose that wide, clear packaging tape would have worked equally well, and I could have saved the expense. Oh well, such is life.



That is my project for this time. I hope you find it interesting enough to build one for yourself.

Footnotes:

[1] *Sams, "IC Op-Amp Cookbook," third edition. ARRL Handbook, 1996 edition NTE937M spec. sheet, http://www.nteinc.com (LF356) Texas Inst., "The Voltage Regulator Handbook," 1977*

[2] *http://sound.westhost.com http://www.zen22142.zen.co.uk/Circuits/Test-gear/sinegen.htm*

[3] *AMQRP.org (for info. about Manhattan Construction)*

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Grace Digital Audio: GDI-IR3020 WiFi Radio

By Loyd Van Horn, W4LVH

With technology for music lovers and radio enthusiasts alike changing as quickly as it does these days, sometimes it is hard to keep up. Wouldn't it be nice if there was a simple all-in-one solution that allowed a person to listen to just about anything they wanted to, but didn't break the bank account?

For instance, I want to be able to stream Internet radio stations, but I also have music on my PC that I want to be able to listen to, and in neither case do I want to be confined to the computer. In addition, I want to be able to listen to my iPod without having to use a separate, large docking station, but I don't want to have to sacrifice audio quality, either. Yes, I want it all.

Fortunately the people at Grace Digital Audio have come up with an answer for me, the GDI-IR3020.

The 3020 incorporates multiple digital audio formats to suit just about any audio need you may have. Everything from Internet radio streams (through Reciva), streaming stations from your Pandora account (more on that great feature later), an iPod dock, and file streaming from a PC or Mac.

❖ Out of the Box

The 3020 came well packaged and came with the audio unit, remote control, AC wall wart, a large selection of iPod docking adapters and instruction manual.

On first impression, the 3020 is a sleek looking unit. The modern feel of steel and black was a nice combination next to some of my other audio equipment. The cabinet is well designed for desktop use, and when viewed from the side, resembles a baseball diamond, enabling the unit to be placed against a wall while still allowing plenty of ventilation.

The function buttons on the top are recessed, which makes them feel very nice when pressing them. The scrolling knob on the front seemed to have a bit of a catch to it; I'm not sure if this was a design feature or a flaw, but when making large volume adjustments, it seemed easy to accidentally turn the radio up more than desired.

The wall wart AC adapter is not huge, but it is still a wall wart, so depending on how much of a premium outlet space is in your home, you may want to consider using a power strip.

The manual is well written and is entirely in English. Most of the 43-pages delve into explaining things like setting up the unit to stream media from a PC or Mac computer. If you have no knowledge of WiFi radios, especially those radios that utilize Reciva, you will find the instructions in the manual more than sufficient to get you up and running in no time.

The 27-button remote control is relatively easy to figure out, although as with most WiFi radios, one shouldn't expect to be able to navigate Internet streams with the remote, unless you use the radio's preset functions. The 3020 will allow you to set up to 99 presets, which is a great deal more than many WiFi radios on the market I have seen.

The iPod docking adapters are marked for the various types and generations of iPod. I found the one that was designed to work with my 80 GB iPod classic, snapped it in, and was ready for the bench test.

❖ Performance Test

The 3020 found my network right away upon power up and had no problems with working with my WEP encryption. The hard part was getting used to the dial interface to enter my WEP key. If you're not used to entering information via a scroll and click knob (to choose a particular character, you push the knob), it may take some getting used to. If you make a mistake, the back key will erase unwanted characters.

The built-in WiFi antenna had no problem getting a signal from my wireless-G router. Even at the opposite end of my apartment and through several walls, the 3020 said it was getting between a 57-71 percent signal strength from the router (there is a handy wireless strength option on the 'Settings' menu). The manual says the unit will work within 300 feet (100 meters) of a WiFi hot spot.

For those without wireless connectivity in their home, the 3020 includes an Ethernet LAN adapter in the back for a hardwired connection. Also in the back are RCA outputs (left and right) for connecting the 3020 to a larger home stereo system.

Navigating the menus to find radio station streams is pretty easy. Stations can be searched, or you can browse stations by location (in alphabetical order). Within a few seconds of turning on the radio, I was listening to a live 64 kbps Real Audio stream from BBC Radio 2 in London.

As mentioned earlier, the 3020 allows you to set up to 99 station presets to quickly access favorite stations. In addition, you can set favorite stations through the Reciva Web site and have fast-access to these stations through a separate menu on the LCD display.

The audio is sharp and clear, with the two 4.5W speakers putting out more than enough audio to be heard at reasonable volumes. With the volume setting at a little more than 30 percent, I was listening quite comfortably with the radio a little more than arm's length away. The highs were crisp, the mids were sharp and not muddy, but the lows were a bit lacking for my personal taste. Others might find the lows to be sufficient, but for folks like me, increasing the volume seems to increase the low end a bit. This was especially true when I plugged in my iPod.

❖ Other Audio Sources

Speaking of iPod operation, the 3020 worked well with my 80GB 6th generation iPod

classic, and the included docking adapter helped my iPod to fit snugly in the docking station. My only complaint was that the iPod controls on both the remote control and on the radio didn't seem to be compatible with my iPod. I double checked the firmware to make sure it was updated (which is an easy to find option on the 'Settings' menu on the radio), which it was.

Another function that was a pleasant surprise was the ability to stream media files from my PC through the 3020. I tested media sharing on both my Windows Vista and Mac OS 10.4.11 machines and it worked flawlessly.

Setting up your PC or Mac will take a little bit of time, but the instructions in the manual include screenshots and well-written instructions to guide you through the process. Once my computers were set up, the 3020 found my shared folders quickly. In no time, I was streaming audio from my PC and Mac through the 3020.

Once I turned on the 3020, my Windows Vista computer automatically recognized it as a Reciva Internet Radio and provided an interface for finding music files on my computer to share with the 3020. Setting up the Mac took a few minutes longer, but only because I hadn't set the Mac up for Windows File Sharing before. Once I did this, the rest of the set-up was a breeze.

A feature I didn't have the opportunity to test was the 3020's ability to stream Sirius satellite radio for those with an account through the provider. The streams come through the Internet like any other Internet stream, but an active

subscription to Sirius is required to access this feature.

Probably one of the coolest features on the 3020 for me was learning about the unit's Pandora functionality. Pandora is a free online service that allows users to create "radio stations" of their own based on their personal music preferences.

For starters, I entered 'The Beatles' as a preferred music group. Pandora then "programmed" a station for me that contained Beatles music, but also other artists that I may like since I am a Beatles fan. For those songs that I didn't like, I was able to give them a "thumbs down," which Pandora remembers when picking future songs. If you like a song, you can give it a "thumbs up." Not only will Pandora remember that you liked that particular song, but it will adjust your tastes based on the qualities of that song as well.

Pandora looks at hundreds of musical traits when selecting songs that users may enjoy, which might be why I have found most of the songs it selected for me to be pretty much in-line with my personal tastes.

To use Pandora on the 3020, you will have to register the radio with Reciva and Pandora and then set up your account on the radio itself. There are built-in spoken directions on the radio itself, as well as detailed written directions in the included manual. Once up and running with your Pandora account on your 3020, you can do all of the things you would normally do with your Pandora player, including giving song feedback (thumbs up or down). If you follow the instructions on setting up your 3020 to stream your Pandora stations, you should have no fees associated with using the service.

❖ A Few Pros and Cons

The 3020 also includes alarm clock operation for those who want to use the unit bedside. In the event of a network or Internet connection problem, the 3020 will automatically switch to a buzzer alarm, so you won't oversleep for work even when the Internet is down. The included instruction manual does a very good job at explaining the alarm operation, both with written and visual instructions.

One feature that I was surprised to see the 3020 *not* include was a built-in FM RDS receiver. Many WiFi radios do, and this would have made the 3020 the complete package for me. True, I can simply tune in the streaming content of the stations in my area, but not everyone may have that luxury, and when the Internet goes down (which happens pretty frequently in my area) it would be nice to have a broadcast backup.

Another feature that would have been nice to have in the 3020 is battery operation. The radio only operates through power from the AC adapter, which leaves me tied to locations with an AC outlet. The unit's size is small enough that it could be easily taken outside the home or even poolside at my apartment community (where there is a WiFi hotspot), but without battery operation, the 3020 will have to stay inside.

Something else that I found peculiar is the lack of ability to control the audio quality coming through the speakers. There are no tone controls, save a few preset EQ settings. Using these, I found I got the best audio quality for my taste by using either the 'flat' or 'jazz' settings, but your preference may vary.

❖ The Final Word

Overall, I think the Grace Digital Audio GDI-IR3020 is a fantastic radio for those who have some experience with WiFi radio and are looking for an upgrade from one of the entry level units, or for those who are looking for an all-in-one component to play their various digital audio sources.

Even those completely new to WiFi radio will find the 3020 to be an easy to use way to get their feet wet. Plus, with the sheer number of Reciva stations available (broadcast, Internet-only and even public safety transmissions), the 3020 should provide listeners with more than enough options to suit their listening tastes and various moods.

I will admit that the lack of an FM receiver and battery operation were pretty glaring holes for a radio of this size and price range. But still, the functionality as an in-home digital audio gateway more than made up for these shortcomings.

For those who want a nice Wi-Fi radio to stream their favorite music stations or talk shows while in the office or working around the home, or even those who want a really nice bedside radio to fall asleep or wake to, the Grace Digital Audio GDI-IR3020 is a fantastic choice. Plus, with the added functionality of an iPod docking station, streaming of Pandora stations and media files on a home computer, the $200-$250 price range makes the 3020 a great value. One could easily spend that much and more on a good WiFi radio or docking station alone.

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The Grace GDI-IR3020 and other Grace models are available from MT advertisers, including Grove Enterprises.

RATINGS

Audio quality	3
Performance	4
Features	3
Design/Appearance	4
Overall rating	3.5

(5 being Best)

MT REVIEW

Grundig AN200 Antenna Loop

For AM broadcast band (540-1700 kHz) portables, nothing peps up the little radio's reception than an external loop antenna. Manufacturers have come and gone, and the Select-A-Tenna continues to be a popular choice for BC band listeners for many years.

Now Grundig/Eton has released a product of their own, the AN200, a low cost, 9 inch diameter, 28 turn coil, tunable loop for the AM broadcast band.

Lightweight and modernistic-styled, the AN200 includes a 1-1/2 inch tuning knob on an arbitrary 0-10 tuning scale which equates to the 540-1700+ kHz range (probably above 2 MHz). A 1/8 inch phone jack is used to direct-couple the loop to the antenna terminals of the operator's receiver. A 3 inch shielded lead with a stereo phone plug on one end, the other tinned wires, is provided.

There is no user's manual, but there is a simple set of three tutorial instructions on the box for non-technical first-timers. Directions address direct attachment to a radio, but don't mention one of the most effective ways of using a loop like this – passive coupling.

By simply setting the loop alongside any radio with a built-in ferrite loop antenna, the AN200 dramatically improves reception. Signals that aren't even present on the unassisted radio come in loud and clear with this passive booster loop.

Tuning is razor sharp, indicating the high Q (selectivity) of the loop, a desirable feature which magnifies the incoming signal to which the loop is tuned without increasing other signals which could cause overload interference.

Setting it up

For maximum reception on a portable AM radio, first stand the radio up and tune in a signal while rotating the radio on its base for strongest reception. Then place the coil broadside and close to the side of the radio and slowly rotate the tuning knob to the point of the strongest signal.

If the receiver doesn't have an internal loop antenna, connect the loop to the radio via the shielded cable. The radio doesn't have to be moved, since it's not sensing a signal from any direction; just peak the adjustable loop to the receiver frequency, then rotate it for maximum signal strength.

Conclusion

We found the new AN200 to be very satisfactory. Its sharp selectivity, adequate aperture (physical size) for acquiring signals, and sturdy construction all deliver improved AM band reception over the small loop antennas that come with pocket transistor radios and home entertainment receivers, and the price can't be beat.

Grundig AN200 Antenna Loop -, $29.95 from Grove Enterprises and other MT advertisers.

John Catalano, PhD
johncatalano@monitoringtimes.com

What's All the Fuss about "Netbooks"?

What Are They? Can They Run Radio Applications? Will You Want One?

By Dr. John F. Catalano

For the past twelve months, one PC appliance has been selling at many times the rate of all others. Its 2009 projected sales are over 20 million units! No, it's not a desktop or even a laptop. It's the sub-notebook, a.k.a. the netbook, a product whose name was coined by an Intel executive about two years ago.

So what is this netbook that's taking the PC market by storm? How were they developed? What are the capabilities of the current netbook? Can netbooks be used for radio monitoring software? What will the next generation of netbook bring?

Let's start by getting acquainted with the original netbook concept.

❖ Silicon Wars

At the beginning of the 21st century, microprocessor manufacturers Intel and AMD were locked in a battle to produce the fastest processor. The clock speeds had blown past 1 Gigahertz, called "impossible" just a few years before. (You'll hear that word many times during this article.) Soon, 2 Gigahertz and higher PCs were on the market. Both companies announced plans for 3 and 4 GHz processors.

However, the marketing and executive departments had gotten ahead of the real world engineering, as they often do. Over the years, processors had evolved with ever increasing speeds and complexities. But scientists and engineers were facing two very real barriers not understood by marketing.

Constantly increasing complexities meant that ever-decreasing sizes of active electronic component structures were required to be fabricated. However, the market push for higher speed required faster operational parameters of these shrinking devices, with the need to dissipate the resulting additional heat. Plus, it all had to be accomplished while increasing production yield, which directly increases profit.

❖ Vaporware or Hardware?

Marketing argued that this development curve had been followed for the past decade, and therefore there should be no problem in extrapolating past the four gigahetz processor and beyond. Obviously, most marketing people have never taken a university level physics course, let alone solid-state physics or thermodynamics.

So, Mother Nature intervened and dictated that, using silicon-based technology, a complex 4 GHz processor was not a commercial, high volume reality. Sorry, but you can't fool Mother Nature.

Intel quickly switched gears and took a two-pronged strategy. For high-end fast processor applications, such as desktops and servers, they would adapt a multi-core processor structure. This concept of parallel processing tasks between multiple processors was not new. InMOS in the 1980s had pioneered the concept. AMD, Intel's rival, had also explored the use of more than one processor in a single package. In fact, they held intellectual property on the concept. Therefore, Intel was required to purchase a license agreement from AMD to manufacture today's Duo and Quad core processors.

But Intel's strategy did not end there. They prioritized their R&D efforts for a small, cost and energy efficient, medium computing power processor. Intel had this project on the back burner for many years. They had watched lustfully as the tiny ARM processor won many low and moderate processor jobs from them. Intel's product goals were to produce a processor with the computing power of a 1.5 GHz Pentium 4, requiring less than half the power of the P4 (about that of a Celeron) and costing very little to produce.

In 2008, all the product goals were realized when Intel introduced to the market their Atom processor. But a company as strategically astute as Intel does not produce a product without having a specific customer(s) and end-product in mind. So what excited Intel to produce their smallest processor? For that, we have to look to the evolution of the PC market.

❖ In the Beginning

Today's PCs are the offspring of mid 1970's microcomputers with names like Altair and KIM-1, see Figure 1. These were little more than programmable calculators, but they opened up the world of possibilities. My KIM-1 (which I still own) was housed in a large attaché case. It used a MOS Technology 6502 processor running at a blazing 1 MHz, with 1K of RAM.

Input commands to the KIM were via a numeric calculator keypad. The display – eight LED digits – was also borrowed from a calculator. See Figure 1. Data storage was via an audiocassette recorder.

That was the state of the art in personal computing in 1976. Just think of how many technical developments it has taken to go from the KIM to today's PC! I was professionally involved with a number of these developments and I can tell you the road was neither easy nor obvious.

❖ Display Development

In 1976, after a few years in the semiconductor industry, I found myself heading-up General Electrics' liquid crystal display product development. One of the major technical conferences for displays was SID, Society for Information Displays. About that time I attended a SID conference that, looking back now, was truly a view of the future, thirty-years hence.

The people from Xerox's PARC (Palo Alto Research Corp) gave a slide presentation on what a true personal computer would look like in the future. They predicted it would be the size of a hard covered book, would open to reveal a full typewriter keyboard, be battery powered, and therefore be totally portable.

I vividly remember the audience's reaction to the presentation. This august group of scientists and engineers began first to talk among themselves during the presentation and then began to call out snide comments such as, "Who is your project leader, Scotty or Captain Kirk?"

But the best (or worst) was yet to come. As a finale to the presentation, they described the display for their Personal Computer. It was a full motion video, full color liquid crystal display, with TV resolution. No one, including myself, could believe that the Xerox people could responsibly extrapolate that far.

My team and I at GE had spent more than a year just trying to produce simple LCD 7-segment numeric displays with a seven year life, stable electrical operating parameters, and wide viewing angle. The end products were appliances and aircraft instrument displays. We were building on six years of LCD work at GE's world famous R&D lab and we were one of the companies at the forefront of LCD technology!

Video rates? Color? Full TV picture resolution?! These Xerox guys were either really crazy

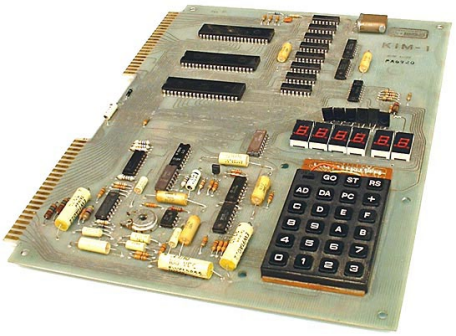


Figure 1 – State-of-the-Art Personal Computer, KIM-1 Circa 1976. Notice the display technology!

or were smoking something extra special.

That was 1976, and the world had to wait almost another fifteen years and witness a number of major LCD technology developments before it became a reality. But it did become a reality and it enabled a new PC product to be born: the laptop.

With the introduction of the laptop, PCs were becoming "personal." But laptop costs were so high that most were sold to business people and companies. Not quite *personal* yet.

The cost of the laptop was dominated by the cost of the LCD. The defining moment came in the 1990s, when Japanese and Korean companies made the leap of faith, investing billions of dollars into the construction of high volume LCD factories. By 2000, full video LCDs of all sizes were rolling off these production lines. They allowed the introduction of new products: Color PDAs, with their small displays, were first.

A few years later, in 2003, a totally new product hit the consumer market with force: portable DVD players. Many companies in Asia produced them in large quantities. Equipped with 5 to 8 inch, full color, full video LCDs and selling for around $100, this product foretold the future of personal computing.

All the elements were now in place for the computing product Xerox had prophesied so many years ago. All except for one: an inexpensive, battery operated, yet relatively powerful, microprocessor.

❖ False "Successful" Starts

At the time, a new product concept called One-Laptop-per-Child (which gave every student an inexpensive, Internet capable laptop) was being kicked around. A similar product concept was dubbed the $100 Laptop. Not having much on-board expense storage or computing power, these concepts were aimed at opening up the vast knowledge of the Internet to students. Computing power, storage and display capabilities were planned to be minimal from the start to keep costs down.

A number of prototypes were produced that performed produced poorly – not much different from 486 processor performance. Needless to say, the USA consumer market reception was not "warm." But it did prove that a market for such a product existed in developing economies and third-world countries.

By the end of 2006, worldwide sales of laptops beat desktops for the first time. The stage was now set for the next phase in the evolution of the PC. The need was there, but one critical piece of hardware was still missing…a microprocessor matched to the new product specs and providing acceptable computing performance.

Into this setting marched Intel, announcing that they would produce the key element that completed Xerox's Personal Computer concept. In Intel's own words:

"The Intel Atom processor was purpose-built for simple, affordable netbooks and nettops. … Great for Internet, these devices are an affordable option for education, photo and video viewing, social networking, voice over IP, e-mail, messaging, browsing, and numerous other Internet activities and basic applications."

Timing is everything in a race, and the race to produce and market a netbook was on. Among the contenders was just about every Asian laptop and portable DVD manufacturer. But the Atom was still almost a year a way.

In order to be the first netbook on the market, the ASUS released the EeePC powered by a Celeron processor. Sporting a 800×480 pixel, 7 inch LCD, a small solid-state hard drive and running the Linux operating system to keep costs down, the EeePC hit the market at a low price of $245. The initial response for the USA market took everyone by surprise; they sold like hot cakes. But the joy was short-lived when the return rate came close to 40% in the first month!

The problem was not the netbook concept, but the Linux operating system. The buyers discovered that Linux was not easily compatible with their existing Windows-based applications and hardware. After all, didn't the "EeePC" name say it was a PC?

By the time the Linux problem was discovered, other manufacturers, such as Acer, had released similar products with similar results. Window XP driven netbook soon followed and their sales grew. But when the Atom N270 replaced the Celeron Netbook, sales exploded. And the sales continue to grow rapidly. Today Asus, MSI, Acer, HP, Dell, Lenovo, Samsung and other manufacturers have netbook products on the market.

❖ Today's Netbook

The screen on the current version of the netbook – for example the Acer Aspire One, or MSI's Wind U100 or U123 – has grown to ten inches with a typical resolution of 1024 x 768. Gone are the tiny solid-state hard drives standard in the first generation. Instead, traditional hard drives of over 100GB are common on today's netbook. This was never envisioned in the original netbook concept. Neither was the inclusion of many other features.

However, today's netbook has developed to where it is competing with laptops where complex, fast graphics is not a requirement. We'll cover the future of netbooks later. Now let's get our hands on an MSI Wind Netbook.

❖ Divine Wind

The U100/U123 manufactured by MSI has a keyboard about two-thirds the size of a full size keyboard. This is larger than most current generation netbooks. The Wind measures in at 260 (W) x 180 (D) x 19~31.5 (H) mm or 10.2 (W) x 7.1 (D) x 0.75~1.24 (H) inches and weighs in at about 2.3 pounds. Equally important, the U100 weighs in at a low street price of under $400.

Figure 2 – MSI's Wind Netbook. Great netbook! Unfortunate name.

Figure 2 shows an MSI Wind U100/U123. The U100 series have Atom N270 processors running at 1.6 GHz, while the U123 have 1.66GHz N280s. Both have 10-inch LCD displays, Windows XP and 802.11b / g Wireless LAN. A 160G hard drive, 1G of RAM (2G for the U123) and a video camera mounted in the frame above the display are included. Eight LEDs along the bottom right provide status indications of systems operation such as battery condition and hard drive operation

A mouse touch pad and its left/right switches are located below the keyboard. My only disappointment with the Wind is that its mouse touch pad does not have continuous screen scroll capability by dragging a finger along the pad. Instead scrolling the screen is accomplished by repeated tapping on special regions on the pad.

A Beautiful LCD

MSI was one of the first to offer a ten-inch LCD, while most other netbooks were using a 7 to 8.9 inch LCD. The ten-inch display makes the screen much more useful for common applications. The screen has excellent display properties. It supports resolutions of 1024 x 768 and 1024 x 600 and handles full motion video with little to no visible smearing. As a result of its size and resolution, full web pages are displayed, thereby eliminating the need for screen scrolling. It is backlit using LED (light emitting diodes), which provides better viewing characteristics with lower power consumption, as compared to the more common fluorescent tube backlights found in laptops.

Connecting to the Outside

Situated along the sides of the Wind are a number of ports. On the right side are the 15 pin D-Sub VGA monitor output, a USB v2.0 port, a SD/ MMC/ MS card reader and a RJ45 wired LAN jack. Although the Wind has an internal microphone and speakers, external jacks are provided for both on the right side.

The left side has two more USB ports and the power supply connector. Notice there are no 9-pin serial ports, required by some radio control programs. Therefore, for these applications we'll have to use a USB to serial adapter.

Two batteries are available. The three-cell version is standard and provides enough power to enable over two hours of operation. The actual time will depend on a number of settings including; display brightness, wireless LAN operation, hard drive activity, and sleep settings.

When the brightness is set to its minimum the two hours is a realistic number. Using the included AC adapter, a full battery recharge is quite quick, within one hour, during which time the Wind still can be used. A 6-cell battery is available which reportedly doubles the operational time to over four hours.

Speed Control

The Wind's "On" switch utilizes a unique form of illumination. When the processor is operating at its normal 1.6 GHz, the switch glows blue. When applications do not require high speed, pressing the "Fn" and "F10" keys together drops the processor's clock to 900 MHz, thus conserving

battery power. In this mode the lamp, fittingly, "goes green."

It has long been known that some processors are capable of running at higher than their published clock speeds. This is referred to as "overclocking." MSI has built in an overclocking capability via the BIOS, but ONLY when the netbook is operated with the AC supply. The BIOS is accessed at turn-on via the DEL key. Once in BIOS, and under the "Advanced" menu, set Intel Speed Step to "Enable." Scroll down to "DOC percentage" and set this to 8%. Save the changes and exit BIOS. Start your Wind. Once your icons are displayed on the Windows' desktop press "Fn" and "F10" together. The On switch lamp will now glow yellow.

If your computer runs without any problem, repeat the procedure, increasing DOC up to 24%. If your Wind operates without problems, as mine did, you now have a netbook with a clock speed of 2 GHz, one of the fastest on the market! Remember, you will only be able to push the processor to 2 GHz when you are NOT running on battery power.

Bonus Feature

The MSI Wind is a hot piece of property these days for another reason. It runs Apple's operating system OS X Leopard just fine! Where else can you find an Apple Laptop for under $400? Nowhere, except the Wind. For details check **http://netbooks.modaco.com/category/390/msi/** and look for "Paul's Complete Guide."

Will It Run Radio Programs?

For *MT* readers that's the real question. To answer it, we tried a number of common radio applications for the TenTec RX320 and the Icom IC-PCR1000. These radios require a 9-pin serial port to interface with the PC. Since most current laptops and netbooks only have USB ports, an IO Gear USB to Serial Converter/Adapter GUC232A was used. See *Computers & Radio* Dec08 for IO Gear Converter details.

To summarize our findings, all the programs we tested worked perfectly. These included Ham Radio Deluxe, TalkPCR, RadioWings, RXPlus, RadioMax and Hamsphere (web radio). Figure 3 shows Ham Radio Deluxe cruising along on the Wind. No difference was detected between the programs' operation on the MSI Wind as compared to their operation on a dual core laptop.

One Caveat

The old devil, RF noise, did raise its ugly head. At first it was severe as seen in Figure 4. This plot was taken with the switch mode power supply attached to the netbook. Notice that the trace is wide – almost a smear across most of the spectrum from 1 to 23 MHz – and the level is centered about -90 dBm.

Now look at Figure 5. Here the plot between 1 and 23 MHz shows less occupied noise frequencies – a more distinct trace without smear. And, as important, the level is way down, below -100 dBm and only rising to -90 at 20 MHz. This made for a much quieter shortwave experience. Noise from the USB to serial adapter is a component of the noise as well.

The difference between Figures 4 and 5 is that the power supply was physically disconnected for the Wind in 5. Clearly, when the Wind runs on batteries the noise is tremendously lower. A possible answer is that harmonically rich pulses from the switching supply are getting into the radio via the serial adapter, with the supply attached. A non-switched, transformer-based power supply may be the answer.

Netbooks' smaller display should be inherently less electrically noisy than their big brother laptops. However, netbook cases are almost completely plastic, not that much different from most laptops. In either case, a shielded outside antenna for shortwave monitoring is a must.

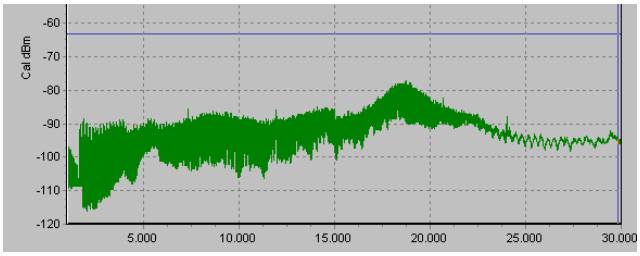


Figure 4 – RF Noise Spectrum with Wind attached to its switched mode power supply.

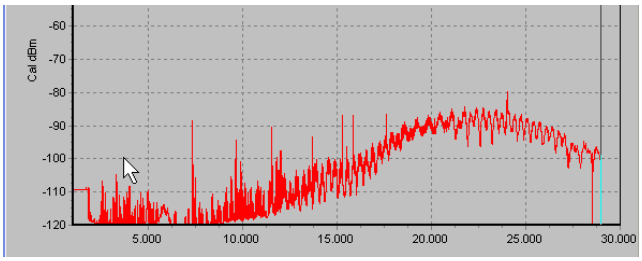


Figure 5 – RF Noise Spectrum with Wind running on batteries.

❖ Where Do Netbooks Fit?

The current netbooks are not the platforms to run aircraft simulations, CAD or complex games. These require constant high-speed calculations and complex graphics. But then, that was never the operational goal of netbooks.

Quite frankly, the MSI Netbook can be used for just about all other PC applications, especially where space and portability are considerations. It easily tucks into a briefcase, but it is also useful at home. True, the screen is smaller than on a laptop or desktop. However, MSI's display fonts are quite legible, and for longer sessions a larger font does the trick. Given the above provisos, today's netbooks are definitely inexpensive replacements for many laptop applications, and can even supplement desktops

❖ Who's Laughing Now?

AT&T and Verizon are now offering netbooks at reduced prices when a user subscribes to their portable broadband service for a period of two years. Netbooks are following in the footsteps of cellphone marketing and distribution. Netbooks are truly personal computers, having now completely fulfilled the Xerox prophecy.

❖ The Future

By the time you read this article, the MSI U200 or similar netbooks by other manufacturers may be on the market with a dual core processor, 12-inch display, Windows Vista and a larger capacity battery. Check **www.msicomputer.com/NB/index.asp** for the latest MSI Netbook products The only factor that stands in the way of a complete netbook take-over of the laptop market is battery technology. Major battery materials development will be needed: first, to have enough capability to operate a multi-core processor and fast 3D graphics. But the difficult part is to manufacture these batteries small enough to fit into the netbook footprint while having five or more hours of operation.

When you considered the technological hurdles we have conquered since the Xerox lecture, the question is not *if* will achieve these technological goals…it's *when*.

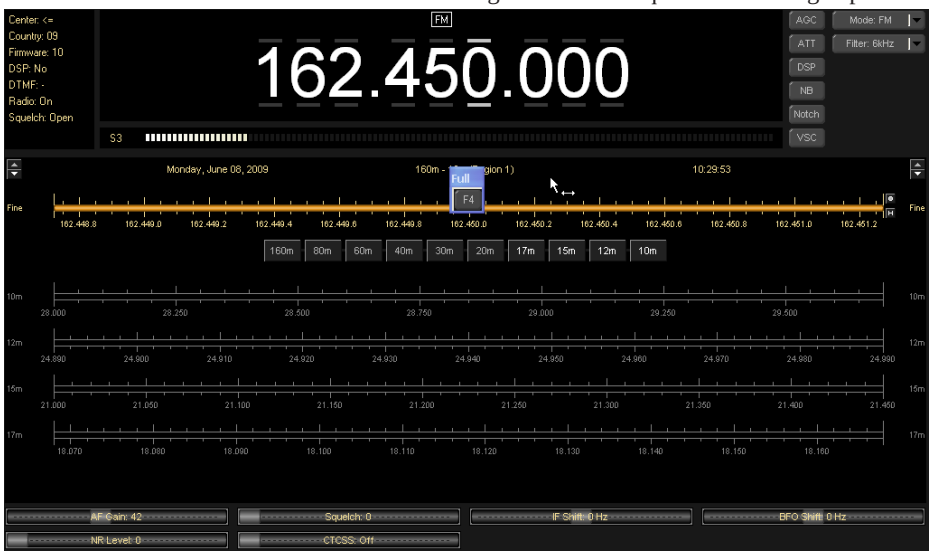


Figure 3 – No sweat! Ham Radio Deluxe running on the MSI Wind Netbook

What's NEW

Tell them you saw it in Monitoring Times

2009 European/North American NDB Handbook/CD

by Michael Oexner

I have recently located a very interesting set of publications for the longwave enthusiasts who DX the Non Directional Beacons (NDB) that transmit on frequencies just below the mediumwave broadcast spectrum.

Celebrating its 10th anniversary, the *European NDB Handbook* (ENDBH) 2009 has the latest NDB information available on 160+ spiral-bound pages in A4 format. It contains data for more than 6300 NDBs located throughout Europe, the Northern African countries, and the Near and Middle East.

Many of the more frequently heard transatlantic NDBs have been included, as well as NDBs operating from offshore installations such as oil platforms. The handbook lists widely reported unidentified beacons and irregular call signs which result from so-called "negative keying." Many a NDB mystery can be solved using this reception technique.

The companion publication of the ENDBH is the *North American NDB Handbook* (NANDBH) 2009. It has 130+ pages that are aimed at DXers located in North and South America, respectively, and contains data for more than 5800 NDBs located throughout North, Central and South America, the Caribbean and the Pacific.

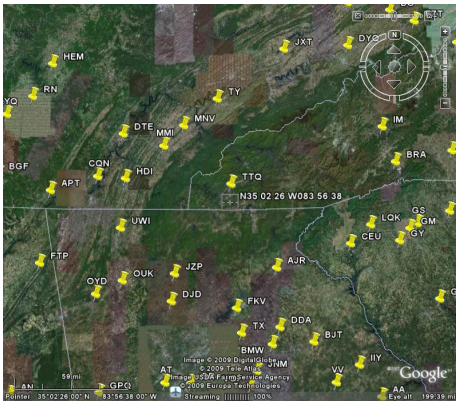
The layout of these NDB handbooks is arranged for ease of use by the monitor.

Part 1 (the reference list) shows the entries sorted by alphabetical order of the call sign and lists the carrier frequency, the modulation frequency, the authority or company taking care of the NDB, name and location of the NDB, country in ITU code, geographical coordinates, distance, Great Circle bearing and Maidenhead grid locator.

Part 2 of the handbook is sorted in frequency order, Part 3 in country order, and Part 4 gives details of decommissioned NDBs.

There is a CD version of each of these handbooks that contains all the chapters of the printed version in the popular Adobe PDF file format, plus some nice extras. Using the PDF allows you to easily search for specific entries, and if you would still like a printed version of the handbook, you can now print it on your own.

The CD contains some additional "bonus tracks" which I know you'll enjoy. This includes over 160 NDB pictures and more than 190 NDB sound clips, plus some useful software packages to produce Great Circle maps or to calculate Great Circle distances and bearings. The CD also contains a Google Earth compatible waypoint file, so that you can "visit" NDB locations around the globe. To run the CD you'll need a standard PC with CD-ROM drive and Microsoft Windows operating system.



As a special benefit to the users of CD NDB handbooks, Michael will include the distances and Great Circle bearings computed for *your* specific listening location. You must supply him with the specific geographic coordinates of your listening post when ordering (recommended format to be used: degrees/minutes/seconds). Also let him know whether you prefer the distances to be shown in kilometers or in miles.

To get your copy, send your order and advance payment to the following address:

Michael Oexner
Hainfelder Str. 1
D-76835 Roschbach, Germany
Email: **michael.oexner@web.de**

All handbooks and CDs will be produced individually, so a production time of two weeks should be expected. Surface mail delivery to the U.S. can add another 8 to 10 days.

The *NANDBH* printed version sells for US$45 (surface mail) and the *NANDBH* CD sells for US$35. When using PayPal for payment, add US$2 to cover PayPal fees. Delivery of the CDs will be via download. In case you still want a physical copy of the CD, please indicate that when ordering.

You can get more information on the outstanding product at **www.beaconworld.org.uk/files/NDBpublications2009.pdf** No active NDB listening post should be without this outstanding reference publication.

Call	kHz	Hz	T	Station	S/P	ITU	Lat	Long	mi	°	Grid
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MMI	242.0	1020	civ	Athens/Mcminn Co	TN	USA	N35 23 41	W084 33 42	43	305	EM75RJ
MNV	361.0	1020		Madisonville	TN	USA	N35 32 42	W084 22 59	43	325	EM75TN
AJR	347.0	1020	civ	Cornelia/Habersham/Baldwin	GA	USA	N34 30 05	W083 33 00	43	149	EM84FM
TY	353.0	1020	civ	Knoxville/Benfi	TN	USA	N35 44 32	W084 04 52	49	351	EM75XR
JZP	285.0	1020	civ	Jasper/Pickens County	GA	USA	N34 27 23	W084 27 36	50	216	EM74SK
HDI	369.0	1020		Cleveland/Hardwick	TN	USA	N35 09 13	W084 54 21	55	278	EM75ND
FKV	365.0	1020	civ	Gainesville/Flowery Branch	GA	USA	N34 12 12	W083 54 23	58	178	EM84BE
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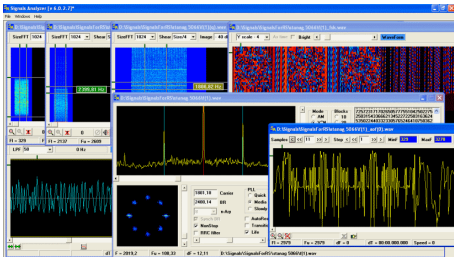
DJD	415.0	1020	civ	Canton	GA	USA	N34 15 09	W084 29 15	63	210	EM74SG

The Signal Analyzer

One of the difficult challenges for any HF utility monitor is to identify the transmit protocol of the digital signal they are monitoring. A new product has been recently introduced that can help solve some of the mysteries of digital DXing. A signal analyzer can help the HF monitor lift the veil on digital signals monitored in the HF radio spectrum.



Signals Analyzer is a program which is designed for the qualitative analysis of different signals. The main thrust of the SA software is the analysis of unknown or unclear or strange signals. The overwhelming majority of existing software-based analyzers do not have powerful and convenient features for real qualitative analysis. Such analyzers provide a poor set of tools, or even reduce the analysis to a simple sort-out of known signals in real time.

Such an approach does not provide a reliable analysis, and it makes the analysis of truly unknown or distorted signals impossible.

SA is the multi-discipline "offline" analyzer which uses audio files recorded by the user. The number of the unique tools and solutions allows you to measure the precise characteristics of FSK, MFSK, PSK, QAM, OFDM signals and of their various combinations and modifications.

SA gives an ability to work with both WAV files, and I/Q data which is widely adopted in SDR technology and various receiving complexes.

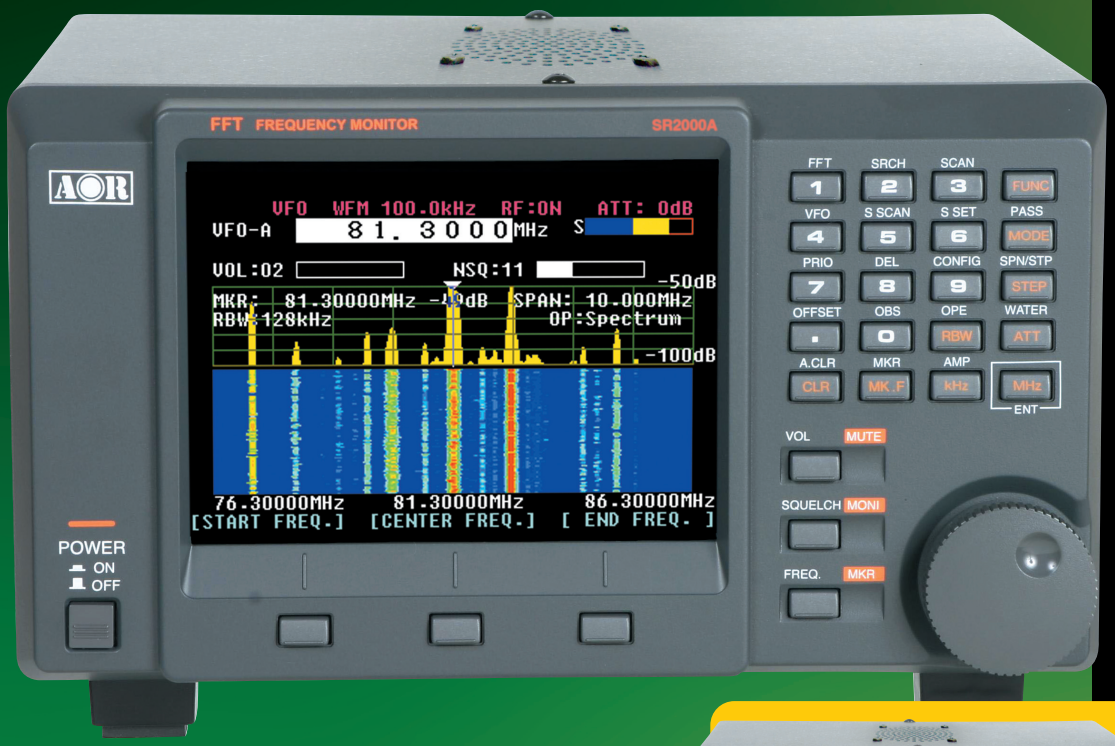
We will have much more on this unique software package in a future *Monitoring Times.* Meanwhile, you can learn more about it at **http://signals.radioscanner.ru/info/item21/.**

Books and equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Larry Van Horn, larryvanhorn@monitoringtimes.com

Watch What Happens!

The SR2000A is an ultra-fast spectrum display monitor that lets you SEE received signals in FULL COLOR

AOR SR2000A
Frequency Monitor



- Frequency coverage: 25MHz ~ 3GHz (no gaps)*
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- External video output (composite video)
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- Displays up to 40MHz of spectrum bandwidth (20MHz or 40MHz selectable)**
- P25 decoding function available with optional P25-8600
- Waterfall (time) display function
- 1000 memory settings (100ch x 10 memory banks)
- Average or peak value readings

simulated video

- Video display function (NTSC/PAL/SECAM auto select)***
- 5 inch TFT color LCD display
- Versatile color display uses state of the art digital signal processing

Using the power of FFT (Fast Fourier Transform) algorithms with a powerful receiver covering 25MHz ~ 3GHz, the SR2000A features a color monitor that displays up to 40MHz spectrum bandwidth or video display of NTSC, PAL or SECAM signals. Ultra-sensitive, incredibly fast, yet easy to use, with a high quality internal speaker for crisp, clean audio signals.*

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*Government version. Cellular blocked for US consumer version.

**No audio is available when the frequency span is set to 20MHz or 40MHz.

***No audio available while displaying video signal on the LCD. If both video and audio need to be monitored simultaneously, an optional (external) TV2000 is required.

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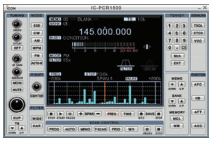

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